



FRIDAY, JANUARY 11, 1901.

CONTENTS

ILLUSTRATED:

Water Jets for Locomotive Driver Flanges.....	20
Wide Fire-box Atlantic Type Locomotive—Baltimore & Ohio R. R.....	22
The Webb & Thompson Electric Switch and Signal Apparatus.....	24
Uniform Adjustment of Brake Cylinder Piston Travel.....	28
The Woods No. 129 Outside Moulding Machine.....	28

EDITORIAL:

Wide Fire-boxes.....	26
Some European Notions on Car Lighting.....	26
Consolidation of the Anthracite Coal Roads.....	27
Editorial Notes.....	26, 27

CONTRIBUTIONS:

Flow of Steam Through Nozzles.....	17
Ratio of Working Expenses in England.....	17

MISCELLANEOUS:

Compressed Air Cars.....	17
The Pension System of the Chicago & Northwestern.....	17
Length of American Railroads Worked by the Block System.....	18
Old Cars and New Conditions.....	20
Annual Report of the Interstate Commerce Commission.....	20
The Works and Product of the Alpha Portland Cement Company.....	21
The Locomotive Truck Brake.....	22
The Arlington Copper Mine.....	22
Michigan Railroad Commissioner's Annual Report.....	23
Corrugated Fire-boxes for Locomotives.....	23
Fast Runs.....	24
Reports of Railroad Building.....	24
The Memorial Bridge at Washington.....	24
Foreign Railroad Notes.....	25
Derailments and Conclusions to be Drawn Therefrom.....	25
The Strength of Nailed Joints Under Shear.....	28

GENERAL NEWS:

Technical.....	29
The Scrap Heap.....	29
Locomotive Building.....	30
Car Building.....	31
Bridge Building.....	31
Meetings and Announcements.....	32
Personal.....	32
Elections and Appointments.....	33
Railroad Construction.....	33
General Railroad News.....	34

Contributions

Flow of Steam Through Nozzles.

Philadelphia, Jan. 4, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In the paper on "The Steam Turbine," read by Mr. Francis Hodgkinson, before the Engineers' Society of Western Pennsylvania, and reprinted in your issue of Dec. 28, the experiments upon the flow of steam are of special interest, as the results are applicable in many lines beside those discussed by the author.

The first published experiments of this kind were made by Napier, whose conclusions are given in *The Engineer* (London), September, 1869, but he does not seem to

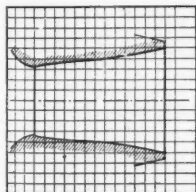


Fig. 1.

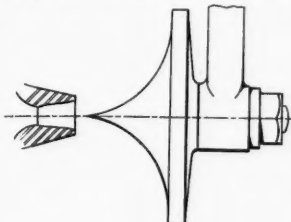


Fig. 2.

have observed the high velocities attained by the jet at the end of the tubes. The diverging form appeared in 1867, applied to a steam ejector for raising water or other fluids, and for all purposes where a high terminal velocity and compact cylindrical jet of elastic fluid are desired, this shape has a decided advantage. The diverging nozzle may be used effectively for steam blowers, locomotive exhaust pipes and injector steam nozzles.

In 1887 Wm. Sellers & Co., Inc., commenced a series of experiments which were continued until 1890, for determining the internal pressures of a jet of steam, and the effect of nozzles of different tapers upon the final velocity of the jet; the method used, and the conclusions, were published in the *Proceedings of the Engineers' Club of Philadelphia*, in 1891, and it is gratifying to note that the results obtained are corroborated so fully by Mr. Hodgkinson. This investigation included all shapes in use at that time, the nozzle now used in the naval turbine, and also an experimental form designed by the writer for obtaining the maximum terminal velocity and minimum loss of energy; the form of this tube was calculated upon the basis of a diverging cross section which should give constant acceleration for each unit of length, with due allowance for the increase of volume and change of specific steam weight during adiabatic expansion. This form resembles that described by Mr. Hodgkinson, but is not *elliptical* as he suggests, but corresponds closely to the curve shown in Fig. 1.

To test the accuracy of the calculated velocities, an apparatus was devised for determining the actual velocity of the steam as it left the nozzle. The weight of flow was first obtained by a surface condenser at atmospheric pressure and the nozzle then arranged to discharge against the target of a special pressure weighing device, of which the frictional resistance was carefully determined. The

target is shown in Fig. 2; the section is one-half of a parabola with final tangent normal to the axis of the discharging jet. From the recorded pressure of the impinging jet and the weight flowing per second, the velocity can be calculated. The results indicate that the usual formula gives values very close to practice, for the discrepancies were less than one-half of one per cent. throughout a considerable range of pressures, and this difference can easily be accounted for by errors of observation.

STRICKLAND L. KNEASS.

Ratio of Working Expenses in England.

London, Dec. 28, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In an editorial paragraph in the *Railroad Gazette* of Dec. 14 you say that "the causes of the increase in the percentage of working expenses on English railways from not much over 50 per cent. some years ago to 58.5 per cent. in 1898 [and I may add, probably quite 60 per cent. in 1900] has doubtless been not an increase of expenses per unit of traffic but lower average rates. . . . We can safely assume that rates have gone down [in England] too." I join with you in regretting the absence of any statistics in England enabling this belief to be justified or disproved. But as statistics are non-existent, and we are all reduced to guessing, I should like to say that I guess that your guess is wrong, and to give briefly the grounds on which I base my opinion.

There is no reason to think rates have been generally or largely reduced within, say, the last ten years. On the other hand, there have been large and important increases. The coal rates to London, for instance, were put up in 1893 by about 4 per cent. "Special" merchandise rates may not have been put up, but a great many have been withdrawn altogether, leaving the freight which formerly went at "special"—that is "commodity"—rates to pay the ordinary tariff. For retail traffic, at what we call "class" rates—and a great part of the English goods traffic is of this nature—it is not denied that increased rates were imposed in 1893, and have been maintained since. The case of passenger traffic, which brings in nearly half the revenue of our railways, is very similar. There were large increases in the third-class fares—90 per cent. of the traffic—on two important lines, the South Eastern and the Chatham, a few years ago. Against this may be set the great development in workmen's tickets at, say, half a cent a mile. There have been important reductions in first and second class fares, but the effect of these reductions has been to attract into first and second class carriages at 4 and 2½ cents per mile, respectively, large numbers of passengers who formerly refused to pay the exorbitant extra charge and chose to travel third class, paying only 2 cents. So that the companies have apparently not lost in net receipts by these reductions. On the whole, I fancy the available evidence goes to show that the average rates are much where they were 10 years ago.

On the other hand, there is, unfortunately, no doubt about the "increase of expenses per unit of traffic." In the 10 years from 1889 to 1899 the number of the railway staff increased from 389,000 to 534,000, and each man received, perhaps, 10 per cent. higher pay and worked, perhaps, 15 per cent. less time at the latter than at the former period. The cast-iron Board of Trade regulations as to signaling, interlocking, mixed train service, etc., have added greatly to the expense of operation. In the last few years supplies of all kinds, and especially coal, have been at abnormal prices. All these causes have greatly increased the expense per unit of traffic. And I cannot see what economies have been effected to counterbalance the increased expense. Passenger trains are longer and heavier than they were, but I don't think the ratio of passenger miles to train miles has increased, while, owing to our inordinate increase in double heading, the ratio to engine miles has probably actually diminished. In main line coal traffic something is being done in the direction of economy by increasing the engine load, and one company has got so far as to haul net loads—I am afraid American readers will smile—of 550 to 600 long tons. But trucks still run about the country by tens of thousands with loads of a few hundredweight apiece, and the normal goods train on a main line probably consists of not more than 30 trucks each with an average load of not more than one ton.

As the *Railroad Gazette* truly says: "England has to compete with the rest of the world," and "substantially all over the world" railway rates have come down. Whether English rates will stop up—to the injury of English trade—or come down, bringing with them disaster to our railway shareholders, no one can at the present moment say. But of economies in operation, such as those which have enabled American roads to take 50 per cent. off their rates and add it on to their net earnings, there are, unfortunately, no signs in this country just yet. Perhaps if our railway companies were to set themselves to find out how much work they really do and how much they charge for it, it wouldn't be a bad beginning. But even the beginning is not in sight yet.

W. M. ACWORTH.

The recent decision of an English court holding that a Trades Union (the Amalgamated Society of Railway Servants) might lawfully be sued, has been reversed by a higher court. The Master of the Rolls holds that a society which is neither a corporation nor an individual, and is not a partnership, cannot be sued, except by direct

statutory enactment. Further, the Master of the Rolls thinks that the omission to make such a provision in the Trades Union act, was intentional.

Compressed Air Cars.

In the January issue of *Compressed Air* appear some figures of the working of the compressed air cars on 28th and 29th streets, New York, which we have not seen published before. The record is given by days from Sept. 26 to Nov. 21, inclusive (47 days), but we reprint the summary only.

Total round trips.....	17,197
Total mileage.....	94,583.5
Total passengers carried.....	1,017,269
Average number passengers per trip.....	59.15
Average number cars running.....	17.5
Average number daily trips per car.....	17.2
Average number miles per day per car.....	94.6

Computed Cost of Operating 20 Compressed Air Cars Under Present Conditions.

	Cents per car mile.
Repairs:	
Including material, supervision, and 9 men, adjusting valves, piping, brakes, rods, brasses, labor, etc., \$35 per day.....	2
Charging station:	
Including oil, waste, foreman, charging gang (2 shifts), oilers, cleaners, etc., \$28 per day.....	1.60
Power house:	
Including engineers, coal passers, pipe fitter, machinist, oilers, etc., and 16 tons coal per day, oil, waste, etc., \$82.50 per day.....	4.71
Cents per car mile.....	8.31
Conductors and motormen, inspectors, roadbed, ties and timber, removing snow, salaries of officers, switches, material, etc.....	9.11
Cents per car mile.....	17.42

The computation is on a basis of 1,750 miles per day, and although every charge is made for the present operating of only 20 cars, yet from 60 to 80 cars could be operated by the charging and power plant without material increase in cost, so that for a more extensive installation the cost of operating would be reduced.

The compressor is much too large for the present service and works at a constant loss. The plant has all the disadvantages of a new plant in the inexperience and lack of trained judgment of the men employed. It is to be noted that the expenses for repairs, two cents per car mile, are remarkably low. On a recent visit to the shops we asked the Superintendent what the repairs chiefly consisted in, and he said that there were really no repairs required; what went under that term was the occasional taking up of the brasses and the usual readjustments of the working parts, as with a first-class locomotive. Of the 20 cars, which is the total number on the line, there is seldom more than one at a time undergoing these "repairs." The estimate of the Compressed Air Company that the running expenses can be reduced to 13.57 cents per car mile, when the conditions are all correctly adapted to the work, does not seem to be unreasonable. With this figure crowding so closely the operating expenses of the electric cars it is to be remembered that the air cars have not in addition the enormous fixed charges for the construction of the roadbed which the electric cars labor under, so that with this load added to the electric service the balance is greatly in favor of the air cars.

Another car is nearly completed which embodies every improvement which experience has suggested. This car is to have a considerably increased storage capacity, so that it will be capable of running 25 miles upon a single charge of air, and it will be tried upon any line that may be suggested. The absolute independence of these cars when charged leads to many suggestions of combination routes for them to run on, as with an omnibus system, for the accommodation of the public by quick transit and the avoidance of transfers. Other things being equal, the independence of all connection with the power house and the easy manipulation of the car as long as its charge holds out give the air cars a great advantage.

The Pension System of the Chicago & Northwestern.

In our issue of Dec. 28, p. 866, mention was made of the purpose of the Chicago & Northwestern to put in force a pension system. Below is the text of the official circular giving particulars of the plan. Readers who wish to compare this with the Pennsylvania plan may find the latter described Dec. 28, p. 857.

For some time the Board of Directors of the Chicago & Northwestern have been considering plans for pensioning the employees of the company who have rendered it long and faithful service, and at the meeting of the Board, held December 12, the following plan having been matured, it was adopted:

The Board of Directors hereby creates the following pension system and rules and instrumentalities for carrying out its provisions. Of the employees in the service of the company the following classes are affected:

(a) All employees who have attained the age of seventy years, and who have been thirty years in the service, shall be retired and pensioned; provided, however, that this clause shall not be mandatory in its application to executive officers appointed by the Board of Directors.

(b) All employees sixty-five to sixty-nine years of age, inclusive of both years, who have been thirty or more years in the service, and who have become incapacitated, may be retired and pensioned.

The monthly allowance paid each person granted a pension shall be upon the following basis: For each year of service one per cent. of the average regular monthly pay for the ten years next preceding retirement; provided, however, that the annual pension disbursement of the company shall not exceed two hundred thousand dollars. Should the aggregate pension allowances exceed this amount, in the absence of action by the Board of Directors increasing the yearly

amount usable for pensions, a new rate shall be established proportionately reducing all allowances.

The terms "service" and "in the service" refer and apply only to those who have given their entire time to the service of the company, it not being the intention of the Board of Directors to pension those who have only given a portion of their time to the company. Employees of the railways owned or controlled by the company shall be treated as employees of the parent company, and the length of service of such employees shall include the time they have been employed by such railroads, whether prior or subsequent to their control or acquisition by the Chicago and Northwestern Railway Company.

Length of service shall be reckoned from the date of entry into the service to the date of relief, all intermediate time out of the service to be deducted and any fractional part of a month to be eliminated from the final result.

Pension allowances shall be paid monthly, until the death of the beneficiary; provided, however, that the company may withhold its stipends in all cases of gross misconduct.

The acceptance of a pension shall not debar any retired employee from engaging in any other business which is not prejudicial to the interests of this company, but he cannot re-enter its service.

A Pension Board is created, to consist of five officers of the company, appointed by the Board of Directors, who shall serve without increase of the compensation they receive as officers of the company. The Pension Board is under the immediate direction of the President, to whom it shall render reports.

No person over thirty-five years of age shall hereafter be taken into the service of the company; provided, however, that in the discretion of the President persons may be temporarily taken into the service, irrespective of age, for a period not exceeding six months, and that this period may be extended, if necessary, to complete the work for which such person was originally employed; provided, also, that, with the approval of the Board of Directors, persons may be employed indefinitely, irrespective of the age limit, where the service to be rendered requires professional or other special qualifications.

Neither the action of the Board of Directors in establishing a system of pensions, nor any other action now or hereafter taken by them or by the Pension Board in the inauguration and operation of a pension system shall be held or construed as giving to any officer, agent or employee of the company a right to be retained in its service, or any right or claim to any pension allowance; and the company expressly reserves its right and privilege to discharge, at any time, any officer, agent or employee when the interests of the company, in its judgment, may so require, without liability for any claim for pension or other allowances other than salary or wages due and unpaid.

The system was put in operation January 1, 1901, by the Pension Board, consisting of the General Manager, General Superintendent, Superintendent of Motive Power and Machinery, Chief Engineer and the Auditor of Expenditures.

Length of American Railroads Worked by the Block System.

From statistics which we have gathered, it appears that the block system—that is to say, some regulation for preserving a space interval between trains moving in the same direction—is now in use on something like 13 per cent. of the railroad mileage in the United States. The names of the roads operating these block-signaled lines, with the mileage thus worked by each company, appear in the large table given herewith. While a percentage equal to less than one-seventh may seem small, it is to be remembered that it marks an encouraging degree of progress. In February, 1892, we thought it appropriate to congratulate our readers on the fact that 3,000 miles of road was block-signaled, and the table which we published then was only 3 in. long.

The table now given cannot be called officially complete, for we have not secured a written statement from every road in the country; but from the results of informal inquiries we believe that no road having block signals worthy of mention is omitted from the list.

The statistics of non-automatic block signaling have been received from the several roads in response to a request for figures showing the length of all "lines (not equipped with automatic block signals) on which either the whole or any part of the trains are regularly run under block signal rules; the essential rule being that a train must not pass a given station or tower until the last preceding train has reached the next station or tower in advance." On this basis the total length of road (not track) worked by the manual system is 23,525.9 miles and the length worked by automatic signals is 2,288.7 miles; a total of 25,814.6 miles. The discrepancies between this and the totals shown in the table are explained below.

The information given in this table was gathered in December. No attempt was made to show the different kinds of apparatus used for automatic signaling; but from information published it appears that one kind, the Westinghouse electro-pneumatic, is that represented in five items under the following five roads: Central of New Jersey; Chicago, Burlington & Quincy; Chicago & Northwestern; New York Central & Hudson River, and Pennsylvania. On the last-named road alone over 500 miles of track is signaled with these signals. The length of road thus signaled on the lines of the five companies aggregates 209.6 miles.

Manual signals having electric locking of one kind or another are found chiefly on five roads, as indicated in the notes explaining the table, namely, Chesapeake & Ohio; Erie; Long Island; New York Central & Hudson River; New York, New Haven & Hartford. These five items aggregate 986 miles of road. The electric staff (used only on single track lines) is found on four roads: the Atchison, Topeka & Santa Fe, the Chesapeake &

MILES OF RAILROAD IN THE UNITED STATES WORKED BY THE BLOCK SYSTEM.

NAME OF RAILROAD.	Miles of Road.						Total.
	Single Track.	Automatic Double Track.	Four Track.	Single Track.	Manual Double Track.	Four Track.	
Atchison, Topeka & Santa Fe:							
Kansas City to Holliday.....	13						
Emporia to Plymouth.....	8						
Four short sections.....	3						
St. Joseph to Bee Creek Junction.....				8			
Double Track Junction to Sheffield.....				436	4		
Holliday to Emporia Junction via Ottawa.....				94	4		
Holliday to Emporia via Topeka.....				114			
Plymouth to Newton.....				28	37		
South Winfield to Purcell.....				165	2		
South Leavenworth to Soldiers' Home.....				2			
Pueblo to Denver.....				113			1,031.0
Atlanta & West Point:							
Atlanta to East Point (jointly with Central of Georgia).....					6.0		6.0
Atlantic City R. R.:							
Camden to Atlantic City.....	53.0			27.3			80.3
Winslow Junction to Tuckahoe.....							
Atlantic Coast Line:							
Richmond, Va., to Rocky Mount, N. C.....				120			
Ashley Junction, S. C., to Charleston, S. C.....				7			127.0
Baltimore & Ohio:							
Philadelphia to Washington.....					137.8		
Washington to Gaithersburg.....					21.5		
Gaithersburg to Washington Junction.....				21.3			
Washington Junction to Cumberland.....					109.4		290.0
Baltimore & Ohio Southwestern:							
Cincinnati to Madeira.....					12.4	2.3	14.7
Boston & Albany:							
Boston (Tower 6) to Lake Crossing.....			16				
Between Lake Crossing and Albany.....	89.5						
Between Lake Crossing and Albany.....	34						
Boston (Tower 8) to Newton Highlands.....	6.5						146.0
Boston & Maine:							
					87		
					4.8		
	6						100.0
Central of Georgia:							
Savannah to Milledgeville.....				17			
M. & A. Junction to Macon.....				3			
Atlanta to East Point.....					6		
Hollins to Elbon.....				2			28.0
Central of New Jersey:							
Jersey City to Bound Brook.....	48.5		30				78.5
Chesapeake & Ohio:							
(Leonard apparatus)				263.7			
(Electric staff lock)				12.8			
				624.5	119.0		1,020.0
Chicago & Alton:							
Chicago (Cal. Av.) to Joliet (Ch. St.).....	33.5						
Joliet to Zarely's.....	4.3						
Joliet southward.....	1.6						
Wann to E. St. Louis.....					16		
Remainder of entire road.....				783.5	63.9		902.8
Chicago, Burlington & Quincy:							
Chicago to Hawthorne.....	8						
Hawthorne to Burlington.....					198		
Galesburg to Quincy.....					100		
Alton to St. Louis.....	17						323.0
Chicago & Eastern Illinois:							
Summit Grove to Lyford.....	8						
Oakdale to Danville.....					113.0		
Balance of System.....				604			725.0
Chicago, Indianapolis & Louisville:							
(See Ohio River Bridge and P., C., C. & St. L. Ry.)							
Chicago, Milwaukee & St. Paul:							
Chicago (Western Ave.) to Galewood.....	5						
Beloit to Beloit Junction.....	2						
Chicago to Milwaukee.....					85		
Milwaukee to Minneapolis.....				332.8			
Galewood to Sabula.....					131.1		
Sabula to Council Bluffs.....				352.3			
Minneapolis to St. Paul.....					10		
North Milwaukee to Portage.....				91.1			
Merrill Park to North Milwaukee.....					6		
Chicago to Evanston.....					12.4		
Western Union Junction to Kittredge.....				109.3			
Brookfield to Madison.....				71.8			
Mason City to Minneapolis.....				143.4			
Madison to Sioux City.....				90.3			
Sabula to North McGregor.....				99.6			
North Milwaukee to Ontonagon.....				365.6			
North McGregor to Mason City.....				116.3			
Rondout to Fox Lake.....				15.5			
Rockton to Beloit.....				3			2,042.5
Chicago & Northwestern:							
Chicago to Clybourn Junction.....	1	2.1					
Chicago to Western Avenue.....	3.3						
Clybourn Junction to Waukegan.....	32.5						
Corralville to Bay View.....	8.2						
Midwestern Avenue to West Chicago.....	26.7						
Geneva to Geneva.....	2.8						
Clybourn Junction to Barrington.....	28.7						
Mayfair to Evanston.....	7.5						
Milwaukee to Lake Shore Junction.....					4.6		
Barrington to Harvard Junction.....					31.1		
Waukegan to Corralville.....					36.6		
West Chicago to Clinton.....					108.0		
Clinton to Council Bluffs.....				293.7	186.3		
				9.0			
				68.8			
				61.8	96.7		
				87.3			
				180.4			
				58.0			
				72.6			
					5.3		1413.0
Chicago Terminal Transfer R. R.:							
Twelfth Street to Rockwell Street.....							
Chicago, Rock Island & Pacific:							
Chicago to Englewood.....	4.0						4.0
Englewood to South Englewood Junction.....	6.7						
Gillett's Cherry Hill.....	3.2						
Chicago & Western Indiana:							
Chicago to State Line.....	5.1						19.8
Chicago, St. Paul, Minneapolis & Omaha:							
St. Paul to North Wisconsin Junction.....					22		
North Wisconsin Junction to Elroy.....				172			
St. Paul to Le Mars.....				243			
Three short sections.....	3.1	1.0					441.1
Cincinnati, Hamilton & Dayton:							
Cincinnati to Hamilton.....					25		25.0
Cincinnati, New Orleans & Texas Pacific:							
Between Cincinnati and Chattanooga.....	220.2			10.1			230.3
Cleveland, Cincinnati, Chicago & St. Louis:							
Cleveland to Berea, O.....					13		
Crestline to Gallon, O.....					4		
Springfield to West End, O.....					2		
Cincinnati to Cleves, O.....					16		
Brightwood to Indianapolis.....					4		
Cincinnati to Columbus.....				123			
Berea to Columbus (except Crestline and Gallon).....				121			
Cincinnati to Indianapolis (except double track).....				94			
Gallon to Indianapolis.....				202.1			
East St. Louis to East Alton.....				20			
East Alton to Indianapolis.....				245.1			
Danville to Cairo.....				270.1			
Sandusky to Springfield.....				130.1			
Springfield to Delaware.....				50.1			
Benton Harbor to North Vernon.....				251.1			
Indianapolis to Kankakee.....				138.1			1,683.0
Delaware & Hudson Canal Co.:							
Albany to Green Island Junction.....		6.9					
Green Island Junction to Waterford Junction.....	5.3						
Waterford Junction to Saratoga.....		26.3					38.5
Delaware, Lackawanna & Western:							
Hoboken to Morristown.....		29.5					
Roseville to Bloomfield.....		2.6					
Bloomfield to Montclair.....	1.5						
Paterson to Dover.....		24.3					57.9

NOTE.—Reference figures are to call attention to numbered explanatory notes in the text.

MILES OF RAILROAD IN THE UNITED STATES WORKED BY THE BLOCK SYSTEM.—Continued.

NAME OF RAILROAD.	Miles of Road.			Manual.			Total.
	Single Track.	Double Track.	Four Track.	Single Track.	Double Track.	Four Track.	
Erle:							
1 st Jersey City to Port Jervis.....	...	...	...	73.9	11.8	...	...
Greycourt to Newburgh.....	...	...	...	13.7	5	...	...
Newburgh Junction to Vail's Gate Junction.....	...	...	...	12.6	...	...	...
West End to Paterson (Newark Branch).....	...	...	...	12.5	3.9	...	...
Rutherford Junction to Ridgewood Junction.....	...	...	...	...	9.8	...	...
N. Y. & G. L. Junction to Sterling Crest.....	...	...	...	27.1	12.8	...	...
Bergen Junction to Nyack.....	...	...	...	4.8	21.5	...	...
N. J. & N. Y. Junction to Spring Valley.....	...	...	...	12.5	10.5	...	...
Port Jervis to Susquehanna.....	...	...	...	...	105	...	...
Lackawanna to Hawley.....	...	...	...	15.9	...	...	...
Susquehanna to Hornellsville.....	...	...	...	...	138.4	...	...
Hornellsville to Salamanca.....	...	...	...	82	...	...	...
Hornellsville to Buffalo.....	...	...	...	...	86.5	...	...
East Buffalo to International Junction.....	...	...	...	...	5.1	...	...
East Buffalo to Suspension Bridge.....	...	...	...	16.9	...	...	...
Salamanca to Hammond, Ind.....	...	...	...	538.6	35.7	...	1,256.5
Hannibal & St. Joseph:							
Quincy to Moody.....	...	...	...	4	...	...	...
Harlem to Kansas City.....	...	...	...	2	...	...	6.0
Illinois Central:							
Four miles of 6-track equal to.....	9.7	69	6	...	...	...	...
Four miles of 8-track equal to.....	...	...	8	...	...	...	92.7
Kansas City, Ft. Scott & Memphis:							
Kansas City to Rosedale.....	...	4	...	...	...	...	...
Rosedale to Olathe.....	...	...	...	...	17.0	...	...
Olathe to Paola.....	...	...	...	22	...	...	43.0
Kentucky & Indiana Bridge & R. R. Co.:							
New Albany, Ind., to Louisville.....	...	...	...	6	8	...	14.0
Lake Shore & Michigan Southern:							
.....	...	...	...	500	913	...	...
.....	...	...	...	...	4.8	...	...
1 st At 31 places on main line, 79.5 miles of track.....	...	40.0	...	...	...	...	1,457.8
Lehigh Valley:							
Parkview to Fairview.....	...	148.3	...	...	...	...	...
Fairview to Sugar Notch.....	11.7	...	...	...	...	...	...
Sugar Notch to Van Etten Junction.....	...	114.4	...	...	...	...	...
Fairview to L. & B. Junction, via Mt. Cut-Off.....	10.3	...	...	...	...	...	...
Depew to East Buffalo.....	...	10.5	...	...	...	...	...
Penn Haven Junction to Black Creek Junction; Montana Branch Connections, and Jeddo Tunnel.....	9	...	...	...	...	...	...
Bernice to Port Bowkley.....	...	...	...	47.4	...	...	...
Mt. Carmel to Black Creek Junction.....	...	...	...	...	47.5	...	...
Kohlmoor Junction to Ashland.....	...	...	...	7.1	...	...	...
Cranberry Junction to Tomhicken.....	...	...	...	8.2	...	...	...
Lumber Yard to Bridge Junction.....	...	...	...	10.7	4	...	...
New Boston Junction to Laurel Junction.....	...	...	...	5	...	...	...
Audenried to Hazle Creek Junction.....	...	...	...	8	...	...	...
Ithaca Junction to Auburn Junction.....	...	...	...	42.6	...	...	...
North Fairhaven to Sayre.....	...	...	...	116.8	...	...	...
Camden to Elmira.....	...	...	...	139.2	...	...	...
South Plainfield to Perth Amboy.....	...	...	...	9.6	...	...	...
Saegertsville Quarries to Slatington.....	...	...	...	3.9	...	...	...
Lizard Creek Junction to York Farm Junction.....	...	...	...	34.9	...	...	...
Towanda to Bernice.....	...	...	...	28.7	...	...	...
Van Etten Junction to Geneva Junction.....	...	...	...	59.5	...	...	...
Geneva to Naples.....	...	...	...	29.4	...	...	...
Seneca Falls to Geneva Junction.....	...	...	...	8.1	...	...	...
Rochester to Hemlock Lake.....	...	...	...	29.1	...	...	...
Towanda Junction to Depew Junction.....	...	...	...	10.5	...	...	...
Depew to Van Etten Junction.....	...	...	...	...	150.8	...	1,114.2
Long Island:							
17 th Long Island City to Floral Park.....	...	...	...	15.6	...	...	...
Long Island City to Woodside Junction.....	...	...	...	3.4	...	...	...
Woodside Junction to Winfield.....	...	...	...	...	1	...	...
Winfield to Whitestone Junction.....	...	...	...	...	3	...	...
Winfield to Jamaica.....	...	...	...	6	...	...	...
Manhattan Beach Junction to Sheepshead Bay.....	...	...	...	4	...	...	...
18 th Ozone Park to Hammels.....	...	...	...	6	...	...	39.0
Metropolitan West Side Elevated, Chicago:							
19 th Canal St. to Marshallfield Av.....	...	2	...	...	...	...	...
On Branch Lines.....	1	...	...	...	...	...	3.0
20 th Michigan Central:							
Suspension Bridge to Welland.....	...	16	...	...	...	...	...
Fort Erie to Welland.....	...	...	...	17.3	...	...	...
Welland to Cayuga.....	...	...	...	...	31.3	...	...
Cayuga to Springfield.....	...	...	...	56.4	...	...	...
Springfield to Dutton.....	...	...	...	...	32.1	...	...
Dutton to Essex.....	...	...	...	76.2	...	...	...
Essex to Windsor.....	...	...	...	...	15.8	...	...
Detroit to Ann Arbor.....	34	...	...	...	...	...	...
Ann Arbor to Dexter.....	...	...	...	9.6	...	...	...
Dexter to Jackson.....	30	...	...	...	...	...	...
Jackson to Niles.....	...	...	...	115.9	...	...	...
Niles to Kensington.....	80	...	...	...	...	...	514.6
Mobile and Ohio:							
On St. Louis division.....	...	...	...	20.0	...	...	20.0
Nashville, Chattanooga & St. Louis:							
Nashville to Shiloh.....	...	...	...	...	2	...	...
Chattanooga to Wauhatchie.....	...	...	...	4.4	1.6	...	8.0
New York Central & Hudson River:							
21 st Grand Central Station to Mott Haven.....	...	...	...	...	5	...	...
22 nd Mott Haven to Rensselaer.....	...	...	...	137	...	...	...
23 rd Albany to East Buffalo.....	...	...	...	...	298	...	...
24 th Black Rock Junction to Niagara Falls.....	...	...	...	17	...	...	...
25 th Near Buffalo.....	...	...	...	0.5	...	...	...
Rensselaer to Troy.....	4	...	...	...	...	...	...
Mott Haven to Woodlawn.....	...	7	...	...	...	...	...
Woodlawn to White Plains.....	11	...	...	...	...	...	...
Westchester to East Buffalo (West Shore).....	...	...	...	85	340	...	...
Geneva to Mahaffy (Penn. Division).....	...	...	...	286	...	...	1,170.5
26 th New York, New Haven & Hartford:							
Boston to Readville.....	...	...	...	...	(c) 29.7	(c) 10.6	...
Readville to Pawtucket.....	...	...	...	...	...	...	...
Pawtucket to B. Av., Providence.....	...	...	...	...	(c) 62.8	(c) 5.0	...
Providence to New London.....	...	...	...	...	...	...	...
Forest Hills to Dedham.....	5.3	...	...	...	...	...	...
Canton Junction to Stoughton Junction.....	5.7	...	...	...	...	...	...
Boston Switch to Worcester.....	38.4	...	...	...	...	...	...
Boston to Middleboro.....	43.6	...	...	...	...	...	...
Boston to Walpole.....	18.8	...	...	...	...	...	...
Mayflower Park to Fall River.....	38.1	...	...	...	...	...	...
Mansfield to New Bedford.....	31.2	...	...	...	...	...	...
Mansfield to Walpole.....	8.4	...	...	...	...	...	...
Port Morris to Pelham Manor.....	...	...	...	(c) 8.8	...	...	...
Pelham Manor to New Rochelle Junction.....	...	...	...	(c) 6.3	(c) 1.8	...	...
Woodlawn to New Haven.....	...	...	...	(c) 49.0	(c) 55.3	...	...
Cedar Hill to New London.....	...	...	...	...	...	...	...
New Haven to Springfield.....	62.0	...	...	...	...	...	...
27 th Wilson Point to Brookfield Junction.....	...	...	...	...	32.0	...	...
28 th Air Line Junction to Middletown.....	...	...	...	...	22.0	...	...
Middletown to Cobalt.....	...	...	...	...	...	5.7	...
29 th Cobalt to Willimantic.....	...	...	...	...	24.0	...	...
Vernon to Burnside.....	...	...	...	...	...	8.6	...
Columbia to Vernon.....	...	...	...	...	18.2	...	...
Hartford to Hopewell Junction.....	...	...	...	...	97.6	...	688.9
New York, Ontario & Western:							
Cornwall to Burnside.....	13.0	...	...	...	...	...	...
Summitville to Mountaindale.....	8.0	...	...	...	...	...	...
Liberty to Parksville.....	6.0	...	...	...	...	...	...
Cook's Falls to East Branch.....	10.9	...	...	...	...	...	...
Galena to Smyrna.....	6.0	...	...	...	...	...	...
Fifteen short sections.....	20.0	...	...	...	...	...	63.0
30 th New York, Susquehanna & Western:							
Jersey City to Riverside.....	...	...	...	1.5	19.0	...	20.5
Riverside to North Paterson.....	...	...	...	...	...	...	...
Norfolk & Western:							
Lambert Point to Roanoke.....	...	...	...	248.8	6.0	...	...
Lynchburg to Durham.....	...	...	...	116.8	...	...	...
Hagerstown to Winston-Salem.....	...	...	...	360.6	...	...	...
Roanoke to Bluefield.....	...	...	...	62.5	43.1	...	...
Coaldale to Ruth.....	1	...	...	...	...	...	...
Poconantas to Bluestone.....	...	...	...	1.5	...	...	...
Ruth to Cooper.....	...	...	...	2.0	...	...	...
Ruth to Mayberry.....	...	...	...	2.9	...	...	...
Cooper to Bramwell.....	...	...	...	1.0	...	...	...
Bramwell to Simmons.....	...	...	...	6	...	...	...
Hale to Trace.....	...	...	...	4.4	...	...	...
Kenova to North Kenova.....	1.0	...	...	...	...	...	...
Kenova to Haverhill.....	...	...	...	20.0	...	...	...
Delano to Kingston.....	...	...	...	5.2	...	...	...
C. A. & C. Tower to St. Clair Ave.....	...	...	...	5	...	...	877.0

(Continued on page 21.)

Ohio, the Chicago, Milwaukee & St. Paul, and the Cincinnati, New Orleans & Texas Pacific; and the total length of the road thus signaled is 33.9 miles.

We believe that only three items in the table duplicate the same mileage; Chicago, Rock Island & Pacific, 6.7 miles, used jointly with the Lake Shore & Michigan Southern; Central of Georgia, six miles, used jointly with the Atlanta & West Point; Lake Shore & Michigan Southern, 40 miles, equipped with automatic signals, all in short sections; these short sections being also included in the total given under the head of manual block signaling.

The total number of miles of road on which the block system is in force for all trains is 18,185.9; this mileage is 8,475.7 less than the total shown in the table. The difference is made up of lines on the three roads noted below. On the Cleveland, Cincinnati, Chicago & St. Louis 1,286 miles of line are operated under regulations which are designed only to protect passenger trains. On the Michigan Central 355 miles are worked under a similar rule, and on the Southern Railway 5,935 miles, a total of 7,576 miles. Adding these to the first-mentioned total makes 25,761.9 miles of road. Beyond this, we have also included in the table 847 miles of the Chicago & Alton, on which the block system is in force only during fogs. Adding this last item we have a total of 26,608.9 miles of railroad in the United States on which block-signal regulations are in force. The total in the table, 26,661.6 miles includes 52.7 miles entered twice, as above noted. This last total (26,661.6 is 6 miles smaller than the sum of the six other columns in the table owing to the reduction of the six-track and eight-track mileage on the Illinois Central to four-track. In one item it will be observed we have had to lump one-track and two-track mileage together, and in another two-track and four-track had to be treated in the same way.

Although this summary is confined to the United States, it will be of interest to mention here that the Canadian Pacific, with 9,931 miles of road, ordinarily protects its passenger trains by a space interval, though under a rule somewhat different from that in force on other roads. This rule is that "no train shall leave a station, following a train carrying passengers, within 30 minutes, unless a report of the arrival of the train carrying passengers at the next station ahead is received, or (on single track) a train from the opposite direction has arrived.

Notes Explaining the Table.

¹This line is worked by the electric staff and is included under the head of "controlled manual."

²and ³—The signals for the block system on this line are now in course of construction.

⁴This item represents 68 miles of line in short sections; all double track; but in each case only one of the two tracks is signaled.

⁵This represents 12 miles of the eastbound track, from South Ashburnham to Fitchburg.

⁶This item represents 97 miles of double track road in short sections; on which, however, only one of the tracks is signaled at any one place.

⁷The Leonard apparatus is an electric "lock and block" machine; this and the following item are classed under "controlled manual."

⁸On that part of the Chicago & Alton not embraced in the first four items, the block system is used only during fogs.

⁹Electric staff.

¹⁰Electro-pneumatic.

¹¹This line is used jointly by the Chicago, Rock Island & Pacific and the Lake Shore & Michigan Southern.

¹²Electric staff.

¹³On those parts of the line where, as from Galton to Indianapolis, the figure 1 is inserted the block signals are used only to protect passenger trains. These sections aggregate 1,286 miles.

¹⁴Forty-four miles of this road, including the four-track portion, has the Sykes locks, and is included under "controlled manual."

¹⁵This item represents 9.6 miles of third track.

¹⁶This includes 6.7 miles used jointly with the Chicago, Rock Island & Pacific.

¹⁷Controlled manual, 15.6 miles.

¹⁸Now in course of construction.

¹⁹Rowell-Potter automatic signals, with overlap and with automatic safety stop; two miles of four track line.

²⁰On those parts of the Michigan Central entered under "manual," the train order signals at each station, controlled by the train dispatchers, are used as block signals behind passenger trains, but not ordinarily behind freight trains.

²¹Unofficial.

²²Controlled manual, with track circuits throughout the length of each block section, and with auxiliary signals for use in case of failure of the electrical apparatus.

²³Controlled manual.

²⁴Items marked c (229.3 miles) have the controlled manual system.

²⁵Seventeen miles more soon to be established.

²⁶Following movements only. From Columbia to Vernon and from Hartford to Hopewell Junction both opposing and following movements are provided for.

²⁷The item marked a represents three miles of third track. That marked b includes some mileage which has three tracks and some which has four tracks. That marked c represents the controlled manual system. The total number of miles of track worked under the block system on the Pennsylvania road is 2,941.1; consisting of 539.5 automatic, 2,399.3 simple manual, and 1.7 controlled manual.

²⁸Three-position signals, a single arm being used both for the home and the distant indication.

²⁹In course of construction.

³⁰The block signals are used only for the protection of passenger trains.

³¹Unofficial. Item marked a includes both double track and single track.

The modifications in the totals may be shown in tabular form as below:

Miles of Road.	
Non-automatic.....	23,525.9
Automatic.....	2,288.7
Total.....	25,814.6
Deduct duplications.....	52.7
Total.....	25,761.9
First total:	
Automatic.....	2,288.7
Non-automatic.....	15,807.2
Total.....	18,185.9
C. C. C. & St. L.....	1,286.0
Michigan Central.....	355.0
Southern.....	5,935.0—25,761.9
Chicago & Alton.....	847.0
Total.....	26,608.9
Add for duplications.....	52.7
Total shown in large table.....	26,661.6

Old Cars and New Conditions.*

Your Committee on "What results are being developed in the old class of freight car equipment by the introduction of the heavy type of locomotives and the larger number of 60,000, 80,000 and 100,000-lbs. capacity freight cars that are being placed in service," beg leave to report:

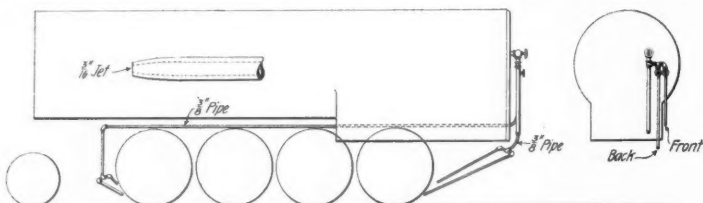
We find a considerably larger number of these cars with broken end sills, body bolsters, draft-timbers and center sills, than when they were not subjected to the severe treatment that they receive to-day. It is found necessary to keep these cars in service for financial and other reasons, and in order that as much satisfactory service can be got out of them as possible, the precaution is generally taken to increase the size and quantity of draft-timber bolts, when renewing draft-timbers. In fact, as a general rule, when the bodies are otherwise in good sound condition, these are put up to the M. C. B. standard and in such cases are not much trouble for some time after. It is found necessary to pay more than ordinary attention to keep the nuts well tightened up to obtain the best results, and on the whole I do not consider that the result is any worse than we might expect.

When these cars were built, they were intended to be used in a train of about 625 tons. We often find them now near the front end of a train of about 2,000 tons, and I am of the opinion that even this is not the most severe test that they are subjected to. Our switching crews are certainly not the tenderest or most considerate class of humanity, and when they get a little excited, look out for trouble. This recklessness has apparently increased somewhat since the general adoption of the M. C. B. coupler, and the light capacity cars suffer more than their heavier neighbors in consequence. As a rule when a light capacity car comes into the shop for general repairs estimated to cost \$60 or more it is condemned at once, to be replaced by one of 60,000 lbs. capacity or more, and consequently it is only a question of time before they will be gone entirely.

Water Jets for Locomotive Driver Flanges.

An interesting topic in connection with the subject of flange wear, which has recently been discussed a number of times, is the use of water jets on the driving wheels of locomotives to reduce the wear of the flanges. The Duluth, Missabe & Northern for several years has had its heavy engines equipped with pipes so that jets of water can be directed against the flanges of the driving wheels, and Mr. William Smith, the Superintendent of Motive Power, says that they could hardly get along without this water attachment, especially on their hill and dock engines.

Very heavy trains are handled on the Duluth, Missabe & Northern over heavy grades and around sharp curves. The road engines are consolidations, some weighing 180,000 lbs., and the switching engines on the docks weigh more than 120,000 lbs. One grade of 2



Piping for Driver Flange Water Jets—Duluth, Missabe & Northern.

per cent. is about seven miles long and trains weighing 2,200 tons without the engine are taken down this hill. The brakes with the retainers set up are continually applied and released for the entire distance. There are many curves on this hill and with the heavy drag going up and the brakes set going down, the service is very severe on the flanges. The water jets are used all the time on the switch engines and, as required, on the hill engines, with the result that the driver flanges suffer very little on account of curves and crossovers.

The arrangement of the piping for a consolidation engine is shown by the accompanying sketch. A $\frac{3}{4}$ -in. cock is tapped into the back head of the boiler below the water line and a pipe is carried down two or three inches to a "T," a short nipple and an elbow. Pipes are then run to the back and front drivers, which pipes are in turn branched to the right and left sides. In this way water jets are available either for running forward or for backing the road engines; on the switch engines the jets at both ends are allowed to run all the time the engines are working.

If the rail is in bad condition and the engine is liable to slip, by using a strong jet of water the rail and tires may be washed clean, giving good adhesion. If the rail is in good condition, only enough water should be used to keep the tires moist. If the water is used in this way there is said to be no trouble experienced from slipping.

The Russian Ministry of Transportation has approved a project for the construction of a railroad 285 miles long in the valley of the Dnieper and eastward to or towards the Azof, and further south than any existing east and west line, connecting several lines to ports on the Black Sea and the Sea of Azof. Work, it is said, will be begun next spring.

*A report to the Central Railway Club by S. King, Esq., President, January 15.

Annual Report of the Interstate Commerce Commission.

The Interstate Commerce Commission, on Jan. 4, sent to Congress its fourteenth annual report. The following abstract is from a synopsis sent out by the Commission in advance of the full report.

The first subject is the need of additional legislation to make the Interstate Commerce Law more effective. The arguments presented in previous years on this subject are not repeated, but the Commissioners say that although their attitude has been misunderstood and misrepresented their views are confirmed by continued experience and observation. The Commission appears to recommend the legalization of traffic associations, taking care, however, not to favor giving such associations any power over rates, even indirectly. . . . It is evident that railroad managers generally have made no attempt to comply with the spirit of the present laws. They may keep within the letter, but their doings are inharmonious with, if not in actual violation of, a federal statute. It is claimed by them that this is necessary. It must be admitted that under present conditions discriminations necessarily occur. If, as is alleged, competition is compelled in all things by one law which is binding upon the carriers, it can hardly be supposed that another law of more or less diverse and opposing tendency will at the same time be obeyed. It is universal experience that capital takes advantage of competition. If public transportation can be bought and sold like a commodity, the largest purchaser will, some of the time, if not all of the time, get the best terms. It is idle to suppose that railroads will actually and all the while compete with each other as to every item of service or facility and at the same time expect that all their patrons, small and large, will be treated exactly alike. Such a result has never yet been realized, and practically will not be realized. The policy now pursued cannot and will not prevent an outcome of vicious discriminations. And what is most unfortunate of all, those discriminations favor the few and place the many at disadvantage. They aid the strong, who have no need of assistance, and handicap the weak with burdens which by comparison are always unjust and often destructive.

Railroad Combinations.—These are now a striking feature of the times. Railroads are likely to combine more extensively and more thoroughly than any other industry. From unofficial sources the Commission gathers that there were absorbed in various ways between July 1, 1899, and Nov. 1, 1900, 25,311 miles of railroad, more than one-eighth of the entire mileage in the United States. When we consider what has actually been done, what is undoubtedly in contemplation, the entire feasibility of these schemes, the very great advantage which would result to the owners of the properties involved, and the fact that a step once taken in that direction is seldom retraced, it becomes evident that in the immediate future the main transportation lines of this country will be thrown into great groups, controlling their own territory,

worked an advance in rate on 531 articles and a reduction upon 105. Using rates from Ohio River points to Atlanta as a basis, the average advance was about 30 per cent. and the average reduction about 26 per cent. Changes were made in the Western classification on Jan. 25 to the number of 257, of which 240 were advances and 17 reductions. The percentage, as computed on rates from Chicago to the Missouri River, were on the average 47.4 for advances and 31.7 per cent. for reductions. By these changes in classification, therefore, rates upon a considerable part of freight traffic in all portions of the United States, many of them applying on the most common articles of merchandise, have been very materially advanced. In addition many commodity rates have been withdrawn, thus making the articles affected take higher class rates.

The Commission refers to its investigation of last December in regard to the changes proposed to be made in the official classification, and says such changes were not made because some articles were found to be paying too low rates or others too high rates compared with other articles in the same class, but that the railways had determined to increase their revenues, and instructed the classification committee to make the changes for that purpose. There was no claim of any unusual need of revenue. Not for years had traffic been so heavy or gross receipts so large as then, but it was insisted that the cost of operation had been enhanced and net revenues would thereby be decreased. Comparisons are made in the report for three large Eastern systems, which show that the percentage of operating expenses to earnings was less in the year ending June 30, 1900, than for the corresponding year 1899, or for the average from 1890 to 1898. Another comparison of these statements shows greater net earnings per mile for 1900 than for 1899, or for the average from 1890 to 1898. It cannot be said what effect these advances in rate, which prevailed during the last half of the year 1900, may have had upon the result for the entire year; but when it is considered that gross receipts, and therefore net revenues, enormously increased during that year, it is evident that there is little in the claim that increased cost of operation justified these advances in rate.

The Commission says its purpose is not to criticize the action of the railways in this respect, but rather to call attention to what has been done, and thereby to what may be done. It has been the understanding of late that the statutes of the United States prohibited the advance of interstate rates by concerted action among the carriers, yet here we find an instance where in every part of this country carriers have by concerted action, without any notice to shippers, and indeed against the vehement protest of shippers, advanced their rates upon a large portion of the merchandise carried under class rates an average of one-fourth. If this can be done with respect to that portion of railway traffic, it can be done with respect to all of it; and if rates can be advanced 25 per cent. they can be still further advanced by the same method. It can no longer be said that a general advance of freight rates is altogether a fancy, for it has become an accomplished fact. Neither can it be said that the public can escape such an advance, however unjust. Hundreds of persons have demanded relief from what has been actually done. In some instances, where the shipper was great enough or the organization to which he belonged powerful enough, that relief has been voluntarily granted by the railways, but the general public and the small shipper have been compelled to make the best of it. Neither, says the Commission, is it our purpose in calling attention to this matter to suggest that the law should be so interpreted or amended as to forbid changes in classification by agreement. A uniform classification is a public necessity.

Previous to the act to regulate commerce there were 138 classifications in territory now covered by the official. A return to that condition would be intolerable. Moreover, the application of that act practically compels carriers to adopt a uniform classification, and it would be the height of injustice to forbid by one statute the thing which another statute in effect compels. But it is equally wrong and intolerable that a classification committee or a railway manager should be able by a stroke of the pen, without consultation with the public, without even informing the public, to arbitrarily change the rates at which freight traffic shall be handled. Carriers should have the right to agree upon a uniform classification and to amend that classification, but when hundreds of shippers complain that a public servant has perpetrated a wrong upon the public in the discharge of a public duty, there should be some public tribunal before which inquiry can be had and by which redress can be administered.

The Commission next refers to the Buffalo Grain Pool. In the course of a hearing recently had in New York City certain facts were developed with reference to what is known as the Buffalo grain pool. The effect of this arrangement has been to create a tonnage pool of the grain moving by rail between Buffalo and New York. Whether the traffic distributed by this pool falls within the jurisdiction of the act to regulate commerce, and whether, therefore, the pool itself is prohibited by the fifth section of the act, is a matter about which, in advance of further investigation and consideration, no opinion is expressed. The carriers insist that this is not interstate traffic within the act. However that may be, the operation of this pool is instructive and apparently bears out what the commission has predicted in previous reports. First, all discrimination and favoritism between shippers is done away with. Second, all competition in respect to the rate is removed. Still, after everything has been said, the fact remains that the existence of this pool probably makes it possible to maintain between Buf-

The report says that 824 changes were made in the official classification on Jan. 1, 1900, of which 818 produced advances in rates and 6 resulted in reductions. Based on Chicago-New York rates, of these advances 434 increased the rate 42.8 per cent. and 32 as low as 15.3 per cent. Six of the advances amounted to 100 per cent. of the old rate. The average advance was 35.5 per cent. Changes in the Southern classification since Jan. 1 last

MILES OF RAILROAD IN THE UNITED STATES WORKED BY THE BLOCK SYSTEM.—Continued.

NAME OF RAILROAD.	Miles of Road.						Total.
	Single Track.	Automatic Double Track.	Four Track.	Single Track.	Automatic Double Track.	Four Track.	
Northern Central (included in P. R. R.)							
Ohio River Bridge and connections:							
Louisville, Ky., to New Albany, etc.	...	...	...	1.5	3.2	...	4.7
Pennsylvania R. R. (and controlled lines east of Pittsburgh and Erie):							
On New York division	...	2.0	86.0	...	...	...	...
On Pittsburgh division	...	21.3	35.0	...	...	...	...
On Pittsburgh division	...	(a) 1.5	...	...	...	...	...
On various divisions	...	...	...	43.0	(b) 744.6	...	...
	...	...	...	...	(c) 0.9	...	934.3
Pennsylvania Lines West of Pittsburgh:							
Pittsburgh to Homewood	...	...	35.0	...	...	...	...
Homewood to Crestline	...	...	...	...	154.0	...	...
Pittsburgh to Columbus	...	...	...	...	193.0	...	...
Sheridan to Verner	...	...	...	2.0	...	...	384.0
Peoria & Pekin Union:							
Pekin to Wesley	...	...	...	...	6.4	...	6.4
Peoria & Pekin Terminal:							
Philadelphia & Reading:							
13th and Callowhill Sts., Philadelphia, to Pottsville Junc.	...	92.6	...	...	...	...	...
9th and Fairmount Ave., Philadelphia, to Bound Brook	...	57.1	0.6	...	...	...	...
West Falls to Nicetown Junction	...	1.6	...	...	...	...	...
16th Street, Philadelphia, to Norristown	...	14.1	...	...	...	...	...
Wayne Junction to Germantown	...	1.7	...	...	...	...	...
Germantown to Chestnut Hill	...	4.0	...	...	...	...	...
Jenkintown to South Bethlehem	...	46.0	...	...	...	...	...
Glenside to Willow Grove	...	4.3	...	...	...	...	...
Newtown Junction to Frankford	...	4.4	...	...	...	...	...
Pt. Clinton to Tamaqua	...	...	...	...	20.0	...	...
Reading to East Penn Junction	...	...	...	36.0	...	...	...
P. H. & P. Junction, Harrisburg, to Shippensburg	...	...	...	41.0	...	...	...
Tamaqua to Snyderstown	...	...	...	3.2	49.5	...	376.1
Philadelphia, Wilmington & Baltimore (included in P. R. R.)							
Pittsburgh, Bessemer & Lake Erie:							
Conneaut Harbor to North Bessemer	...	...	...	145.6	6.0	...	151.6
Pittsburgh & Lake Erie:							
...	...	10.0	...	146.0	...	...	156.0
Pittsburgh & Western:							
Allegheny to Newcastle Junction	...	...	...	...	54.0	...	54.0
Richmond, Fredericksburg & Potomac:							
Richmond to Quantico	...	...	...	82.0	...	...	82.0
Rio Grande Western:							
Tucker to Soldier Summit, Utah	...	...	...	...	7.0	...	8.7
South Side Elevated, Chicago:							
Van Buren Street to Stony Island Avenue	...	8.7	...	...	...	...	8.7
Southern Railway:							
Atlanta to Shops	...	2.0	...	...	...	...	...
Alexandria, Va., to Orange	...	...	...	86.0	...	...	...
North Ave., Ga., to Peyton	...	...	...	...	5.0	...	...
Peyton, Ga., to Austell	...	...	...	11.0	...	...	...
Weems, Ala., to Coalburg	...	...	...	...	27.0	...	...
Remainder of entire line	...	...	...	5935.0	...	...	6066.0
Southern Pacific:							
St. Louis, Keokuk & Northwestern:							
St. Louis to West Alton	...	14.0	...	42.0	...	...	77.0
Terminal Railroad Association of St. Louis (including Merchants' Bridge line):							
St. Louis to East St. Louis	...	16.0	...	...	...	...	16.0
St. Louis to Granite City	...	...	...	...	3.0	...	...
Staten Island Rapid Transit:							
Mariner's Harbor to South Beach	...	8.7	...	...	...	...	8.7
Wabash Railroad:							
East Decatur to Tilton	...	...	...	70.9	...	...	70.9
West Jersey & Seashore (included in P. R. R.):							
Wisconsin Central:							
Kolze to Altenheim	...	...	...	6.1	...	...	6.1
Total	405.5	1,653.3	235.9	18,144.0	5,823.8	45.1	26,661.6

falo and New York a rate from 1 to 2 cents per bushel higher than has in recent years actually been paid. If other combinations could be made to eliminate competition in other directions, much greater advances would be possible. The Commission has previously expressed the belief that arrangements of this kind might properly, in some cases, be permitted, but only after a method had been provided by which the rate, when made, could be actually controlled.

The thought naturally suggests itself, Is the advance of 1 or 2 cents a bushel in this rate of much consequence? One cent a bushel applied to all the grain which moved through the port of Buffalo in 1899 would amount to \$1,500,000; and applied to all the grain moving by rail in the United States for that year it would have aggregated almost \$10,000,000. The Danville (Va.) case is also referred to under this head.

Joint Rates.—A wrong adjustment of rates cannot be effectively corrected unless the regulating body has power to determine what rate or what relation of rates shall be substituted in place of the one found to be unreasonable. Incidentally, in that same connection it has been observed that when the rate attacked is a joint rate, participated in by two or more carriers, no relief can be granted unless the further authority exists to determine the divisions of this joint rate which each carrier shall receive when the carriers do not themselves agree. This matter of joint rates and their divisions, while it has not received much attention up to the present time, will be found ultimately of first consequence. If joint rates are to be regulated authority must be given over their divisions. It is possible that such authority exists now, but the carriers deny this, and the importance of the subject should not be overlooked.

The routine work of the Commission has increased, but the force is better trained and more effective, so that 121 clerks do more work than was formerly done by 134. The construction of tariffs has been greatly improved, so that they can be dealt with much more easily than in former years.

The number of complaints received during the year, formal and informal, was 639, but few of which reached the formal stage. Complainants, knowing the inability of the Commission to enforce its decisions, were unwilling to take the trouble to prepare formal complaints. The 20 formal cases brought during the year are briefly stated in the report. The decisions rendered by the Commission during the year are also reported. The more important of these have been given in the *Railroad Gazette*. Eighteen civil cases are pending in the federal courts to enforce orders of the Commission. In some criminal cases the accused have pleaded guilty and paid fines. A number of indictments are awaiting trial in Louisiana. In the Behlmer case (Summerville, S. C.) the United States Supreme Court, on Jan. 8, 1900, amplified its former construction of the long and short haul law. It is held that

both the Commission and the Circuit Court of Appeals mistakenly considered, as a matter of law, that competition, however material, arising from carriers who were subject to the act to regulate commerce could not be taken into consideration, and likewise that all competition, however substantial, not originating at the initial point of the traffic, was equally, as a matter of law, excluded from view. No decision was rendered by the court upon the facts in this case.

In the Colorado Fuel and Iron case the Circuit Court of Appeals reversed the decree of the Circuit Court and directed dismissal of the complaint. The Circuit Court upheld the decision of the Commission, but the Circuit Court of Appeals, following later decisions of the Supreme Court, held that the Commission was without authority to prescribe rates for future observance by the carriers, and that this applied as well to an order of the Commission determining the relation of rates between localities as to an order prescribing maximum rates. The court further said that determining the relation of rates involved the exercise of legislative functions to the same extent as fixing the rate on an independent consideration of what would be a reasonable compensation for the service. In reviewing the decision of the Court of Appeals the Commission takes occasion to state the necessity for authority to regulate rates for the future, and shows that a suit at law for damages cannot be an effectual remedy. A number of other court decisions are reported.

The report gives an abstract of the statistics of the railroads of the country for the year to June 30, 1899, and an abstract of the preliminary statistical report for the year ending June 30, 1900. This latter was given in the *Railroad Gazette* of Dec. 28, p. 860.

Safety Appliances.—The safety-appliance act became fully effective on Aug. 1 last. Railway equipment in regard to hand holds and grab irons and standard height of drawbars shows approximately perfect compliance with the statute. The Government has not undertaken to decide the coupler that shall be used, the number or location of hand holds or grab irons, the height of drawbars, or the number of cars in a train to be provided with the air-brake. These matters are all left to the carriers.

Since the law went into effect no complete or accurate information regarding accidents has been obtained. A large number of the accidents to employees can only be attributed to carelessness, and the Secretary of the Commission addressed a letter to the subordinate branches of various railway organizations [brotherhoods] calling attention to the need of greater care and caution. It was also suggested that reports of accidents shall be made by the organizations to the Commission, with a view of minimizing, as much as possible, the need of resorting to the courts for enforcement of the law, and so avoiding the friction and consequent hostility which frequent litigations of this character must inevitably engender. No prosecutions under the act have yet been found necessary. In cases where it was found necessary to call attention to

defects in appliances or in their operation, the railroad managers have thus far readily complied with not only the letter but the spirit of the law, and have not been inclined to cavil about the application of the statute in doubtful cases.

June 30, 1899, there were 928,924 persons employed on United States railroads. During the year ending that date 2,210 of such employees were killed and 34,923 were injured in railroad accidents. The number of killed and injured in coupling and uncoupling cars was somewhat less in that year than in the year preceding. Tables comparing 1893, 1897, 1898, 1899, and 1900, show some decrease in the number of accidents in 1899 and 1900. In 1893, in coupling and uncoupling cars, the ratio of killed and injured to the number employed was: Killed, 1 in 349; injured, 1 in 13. In 1899 these ratios were: Killed, 1 in 563, and injured, 1 in 22.

To the end that every precaution may be taken, and that no careless, indifferent, ignorant, or selfish individual may be permitted to endanger his fellows, a system of public supervision should be maintained and a close inspection made of the rolling stock in service, so that no wear or breakage may go unnoticed and unremedied. It is not proposed that such public inspection shall in any respect interfere with the duties of the operating companies respecting repairs. Such inspection will require some expenditure of money—small, however, in comparison with the interests affected. Any appropriation of the public funds must be justified by the object to be attained, and a comparison is made of expenditures in the Life-Saving Service, Lighthouse Establishment, and Steamboat Inspection Service.

The Commission has had a special appropriation of \$15,000 with which it has employed inspectors to gather information concerning safety appliances and the general condition of the train service. The railroads have responded favorably to the suggestions made by the Commission in this connection.

Any estimate of reduction in the number of accidents due to the adoption of safety appliances must take into account the changes in conditions since 1893, when the law was enacted. At that time the average trainload was about 184 tons, while in 1899 it had risen to an average of 243½ tons. The small cars and lighter locomotives then in general use have given place to much heavier equipment. Steel cars have been introduced, capable of carrying 50 tons each. The use of heavy cars and engines in the same trains with old wooden and lighter cars subjects the draft rigging and couplers of these lighter cars to unusual strain, and results in many accidents which formerly would not have occurred. Of course, the risk to the men employed in handling trains of cars of mixed capacity and greatly varying strength is much increased. This was a risk the employee was not called upon to take in 1893, when the law was enacted.

The Commission now has a library of 5,500 volumes and 7,200 pamphlets, which is a constant aid to the Commission and is used by students of transportation questions.

The Works and Product of the Alpha Portland Cement Company.

A few weeks ago a number of civil engineering students from Columbia University, under the guidance of Prof. Lovell, visited the works of the Alpha Portland Cement Company, near Easton, and the notes that follow were prepared by a couple of those students. They are a pretty good example of reporting, and furthermore, are in themselves interesting as an account of one example of what has come to be an important engineering industry.

The works of the Alpha Portland Cement Company are at Alpha, N. J., on the main line of the Lehigh Valley Railroad, 70 miles from New York and four miles east of Easton, Pa. The company owns about 140 acres of land all underlain with the cement rock from 0 to 5 ft. below the surface. The dip of the vein is 36 deg. The rock is an argillaceous limestone of slaty color. At present it is being quarried at a depth of 85 ft. and borings have been made to a depth of 185 ft. from the surface without finding any change in the nature of the rock.

The rock lacks 4 per cent. of lime necessary to make a first class Portland cement. To supply this lime a certain amount of limestone from the Lebanon Valley is mixed with the natural rock. This mixing is done at the crushers, which reduces the rock to about the size of a man's fist, whence it goes to four crackers, which grind it to about the size of a walnut. From the crackers the material is taken by belt conveyors to a drier which is a revolving cylinder 40 ft. long and slightly inclined. At the elevated end of the drier is a furnace, the hot gases from which pass through the cylinder. The material is then taken by a belt conveyor to a hopper, from which it is distributed to nine Griffin mills, and also a ball and a tube mill. The ball mill is a large revolving drum containing cannon balls, and the tube mill is a cylinder 21 ft. long, 5 ft. in diameter, containing Norway pebbles. The capacity of the ball and tube mills is three times that of the Griffin mill, and the Griffin mill takes 25 h.p., the ball mill 30 h.p., and the tube mill 70 h.p.

From these mills the material goes to 10 kilns. These kilns are 60 ft. long and from 5 ft. to 7 ft. in diameter. They are inclined ¾ in. per foot, and revolve on three bearings. These kilns revolve continually, and each has a capacity of 150 barrels per day. The material enters the high end of the kiln through a water-jacketed feed device. The fuel is powdered coal, which is blown in through a pipe at the lower end of the kilns. The tem-

perature at the lower end is from 2,500 to 3,000 degrees, while at the rear end it is only 1,500 degrees. The clinker drops out of the forward end through shafts to the foot of five coolers. It is then lifted by bucket elevators to the top of the coolers. The coolers are vertical iron cylinders, in the center of which is a perforated pipe through which air is blown. Baffle plates are placed along the pipe and sides of the cylinders.

From the coolers the material is wheeled to crackers, and thence passes to 15 Griffin mills, where it is ground and then is passed through an inclined screen. This is equivalent to passing through a 100-mesh sieve. Tailings are sent to a tube mill. The fineness of the finished product is such that 95 per cent. must pass through a No. 100 sieve and 75 per cent. through a No. 200 sieve.

The powerhouse contains one 1,000 h.p. engine, an air compressor of 125 h.p. and six auxiliary engines. The big engine drives two shafts, the first of which drives 9 Griffin mills and one ball and tube mill for the raw material. The other drives 11 Griffin mills for the clinker. Of the two large auxiliary engines one drives the remaining Griffin mill and tube mill for the clinker, and the other engine drives the three Griffin mills used in grinding the coal. There are 11 boilers using 70 tons of coal per day, and the kilns burn 100 tons per day. The water is pumped from the Delaware River, 7,000 ft. away, to a reservoir near the works.

There is a laboratory where a qualitative and quantitative analysis is made on the material taken from the quarry before the blast, the ground raw material and the finished product. Sample analysis of the raw material and finished product are given.

Raw material.		Final product.	
SiO ₂	11.96	SiO ₂	20.38
Fe ₂ O ₃	2.72	Al ₂ O ₃ + Fe ₂ O ₃	10.58
Al ₂ O ₃	4.64	CaO	63.30
CaO	42.12	MgO	2.86
MgO	2.11	SiO ₂	1.13
CO ₂	35.44		
	98.99		

Rest H₂O, graphite and organic matter.

There is a testing laboratory where tests are made for fineness, soundness, strength and activity.

A new plant with a capacity of 2,000 barrels per day

is now being built near the present plant. The new plant is to have ball and tube mills exclusively and 10 kilns which ride on two bearings. It will have 6 Sterling water tube boilers, and two 1,000 h.p. engines. The combined capacity of the two plants will be 3,500 to 3,700 barrels per day.

The present plant will soon be run by electricity. The power supplied will be at a point on a canal at Raubsville, two miles from plant, where there is a 40-ft. fall into the Delaware River. This will generate from 1,500 to 1,800 h.p., which will be more than is needed for the old plant, and the surplus will be used in the new plant. Both plants will also be equipped with steam for emergency use.

The Locomotive-Truck Brake.*

Some years ago, in commenting upon the report of the Massachusetts Railroad Commissioners with reference to a fatal railroad accident that had been subjected to an unusually careful and exhaustive examination, the *Railroad Gazette* said:

"Over and over again, we have the lesson in passenger train accidents that it is the last 20 or 30 ft. that kills. One of the clearest of these was a famous accident in 1890, when 23 people were killed, and none would have been killed if the train had been stopped 45 ft. sooner."

In the face of such facts as these, it is difficult to understand why railroad managers do not exhaust every resource to obtain the closest approximation to absolute control over their trains by the application of the highest possible braking power to every wheel.

The available braking weight of a train is the total weight of the locomotive, the light weight of the tender, and the light weight of all the cars. That proportion of all this available weight which is carried by the truck of the eight-wheel locomotives customarily employed to haul suburban trains, is much greater than may readily be

supposed. Most suburban trains consist of from three to five cars, though they not infrequently consist of but two, or as many as six or even more. Under the conditions of generally prevailing practice, the proportion of the available braking weight carried by the locomotive truck is as follows:

For a two-car train, about 15 per cent.

For a three-car train, about 12 per cent.

For a four-car train, about 10½ per cent.

For a five-car train, about 9 per cent.

For a six-car train, about 8 per cent.

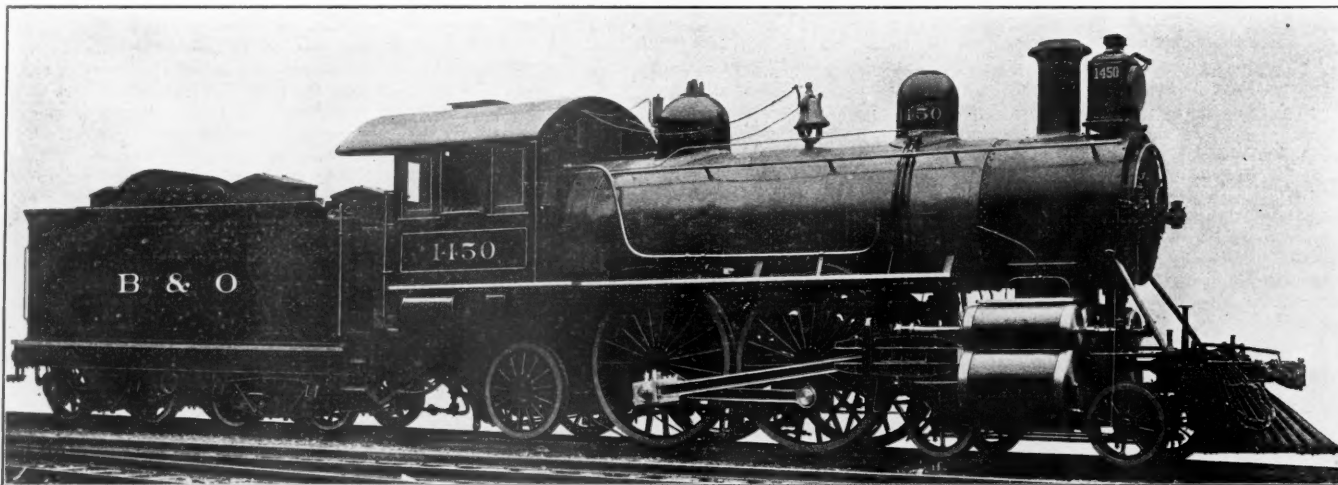
Considering the case of a six-car train only, can any one deny that there have been and will be many instances where the sacrifice of 8 per cent. of the available braking power of a train, thereby increasing the length of stop one-twelfth, accounts for the destruction of valuable property and frequently the loss of invaluable life? In these days much consideration is given to the necessity of high acceleration, and to this end the short suburban trains are now very generally handled by much heavier locomotives than were formerly employed in this service. The corresponding necessity for a high rate of retardation in stopping does not appear to have had equal consideration, and yet it is certainly not less important to shorten the time and distance of making the frequent stops required than to quicken the start, in order to maintain a high average rate of speed between stations. With a given period of time from start to stop, also, the ability to stop quicker means economy in fuel consumption, because of the lower maximum speed necessary to maintain the schedule.

The value of the use of the locomotive-truck brake is not confined to suburban, or, in fact, to passenger service; its efficiency, as a factor of safety, can scarcely be overestimated in cases where locomotives so equipped are required to handle short trains of loaded freight cars, especially upon heavy grades, and where the proportion of total available braking power dependent on the locomotive is therefore especially high. It is also frequently necessary to move freight locomotives over the line without trains, or with only a caboose attached, and in such cases the rate of speed always closely approximates and often exceeds that of passenger trains. Under these conditions, the braking weight carried by the locomotive truck

is now being built near the present plant. The buildings are of steel and corrugated iron, with the exception of the power house which will be of stone with a steel roof. The power house will probably be under roof, and the steel work for the other buildings delivered about the time of the Annual Meeting.

Wide Fire-Box, Atlantic Type, Locomotive—Baltimore & Ohio Railroad.

The accompanying engravings show the first one of a lot of wide fire-box Atlantic type passenger locomotives built for the Baltimore & Ohio by the Baldwin Locomotive Works. Bituminous coal will be used. The grate area is 42.5 sq. ft. and the total heating surface is 2,663 sq. ft., of which 150 sq. ft. is in the fire-box. The tubes are 16 ft. 1 in. long. The fire-box length is 102 in., about the same as that of the new passenger locomotives of the Chicago & Northwestern, but the grates are a little nar-



Wide Fire-Box Atlantic Type Locomotive.

rower, being 60½ in. The cab is at the rear and the Vauclain system of compounding is used. The fire-box has a brick arch. The total weight of this engine in working order is 149,600 lbs., and the weight on drivers is 83,400 lbs. The tender has a capacity for 5,000 gals. of water and 8 tons of coal.

The following is a list of the general dimensions:

Kind of fuel to be used.....	Soft coal
Weight on drivers.....	83,400 lbs.
Weight on truck wheels.....	37,940 lbs.
Weight on trailing wheels.....	28,260 lbs.
Weight total.....	149,600 lbs.
Weight tender loaded, about.....	100,000 lbs.
Wheel base, total, of engine.....	25 ft. 7 in.
Wheel base, driving.....	6 ft. 9 in.
Wheel base, total (engine and tender).....	52 ft. 6½ in.
Length over all, engine.....	40 ft. 5 in.
Length over all, total, engine and tender.....	62 ft. 6½ in.
Height center of boiler above rails.....	8 ft. 7 in.
Height of stack above rails.....	14 ft. 6½ in.
Heating surface, fire-box.....	150 sq. ft.
Heating surface, tubes.....	2,513 sq. ft.
Heating surface, total.....	2,663 sq. ft.
Grate area.....	42.5 sq. ft.
Drivers, diameter.....	33 in.
Truck wheels, diameter.....	33 in.
Journals, driving axle, size.....	8½x12 in.
Journals, truck axle, size.....	5½x10 in.
Main crank pin, size.....	6½x6½ in.
Cylinders, diameter.....	15 and 25 in.
Piston, stroke.....	28 in.
Piston rod, diameter.....	3½ in.
Kind of piston rod packing.....	Metallie
Main rod, length center to center.....	30 ft. 9½ in.
Steam ports, length, circular.....	34 in.
Exhaust ports, length, circular.....	34 in.
Exhaust ports, width.....	4½ in.
Bridge, width.....	3½ and 2½ in.
Valves, kind of.....	Piston
Valves, greatest travel.....	5½ in.
Valves, outside lap.....	H. P. 78 in.
Valves, inside, clearance.....	L. P. 18 in.
Valves, lead in full gear.....	L. P. 0 in.
Boiler type of.....	Straight
Boiler, working steam pressure.....	200 lbs.
Boiler, material in barrel.....	Steel
Boiler, thickness of material in barrel.....	11-16 and 5/8 in.
Boiler, diameter of barrel.....	62 in.
Seams, kind of horizontal.....	Butt jointed, double cover riveted
Seams, kind of circumferential.....	Double riveted

*From a Bulletin issued by the Westinghouse Air Brake Co.

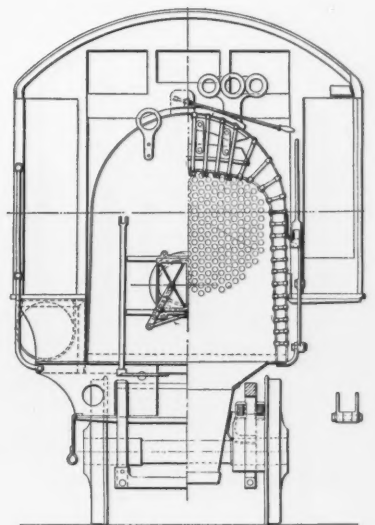
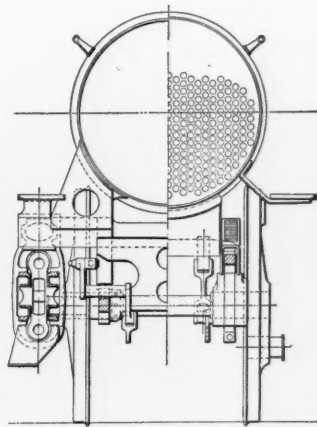
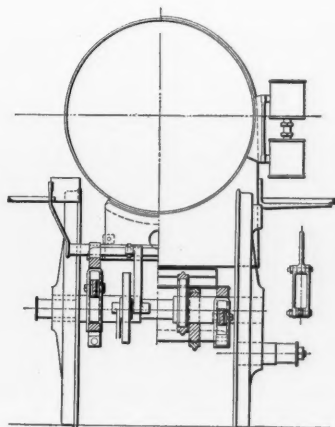
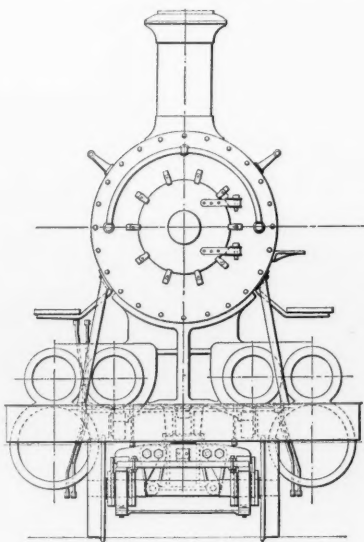
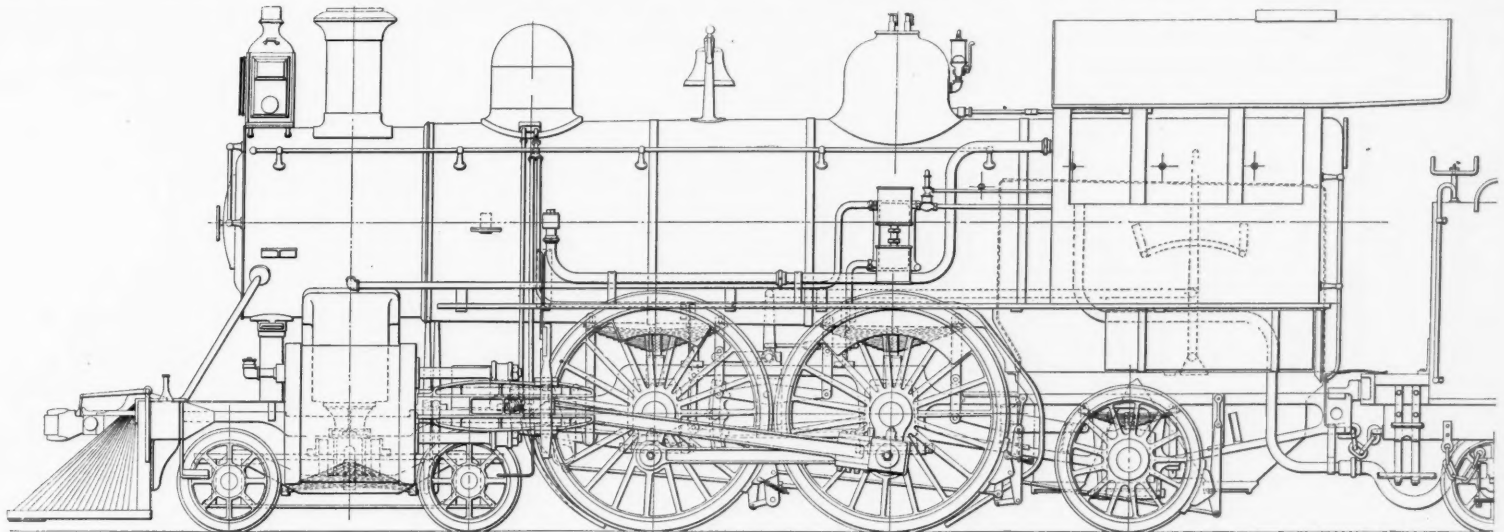
Thickness of tube sheets.....	1/2 in.
Thickness of crown sheet.....	3/8 in.
Crown sheet stayed with.....	Radial stays
Dome, diameter.....	31 1/2 in.
Fire-box, length.....	8 ft. 5 15-16 in.
Fire-box, width.....	5 ft. 1/2 in.
Fire-box, depth front.....	64 in.
Fire-box, depth back.....	62 in.
Firebox, material.....	Steel
Fire-box, thickness of sheets.....	5-16 in.
Fire-box, brick arch.....	Yes
Fire-box, water space, width.....	Front 4 in., sides 3 in., back 3 in.
Grate, kind of.....	Rocking and drop
Tubes, number.....	300
Tubes, material.....	Lap welded iron
Tubes, outside diameter.....	2 in.
Tubes, length over sheets.....	16 ft. 1 in.
Smoke-box, diameter.....	63 in.
Smoke-box, length.....	65 in.
Exhaust nozzle.....	Double
Exhaust nozzle.....	Permanent
Netting.....	Wire

with steam roads have been established during the past year. The Commissioner tries to have interlocked signals or suitable mechanical protection at existing grade crossings. At many crossings the travel has increased so that the conditions are more dangerous than when the crossings were approved, and orders have been issued for additional protection at certain crossings; but the authority of the Commissioner has been contested and the question is pending in the Supreme Court. To depend on the conductor of a street car to make sure, without mechanical appliances, that a steam railroad crossing is clear is not a sufficient safeguard, because incompetent men are sometimes employed in this work.

It is recommended that the law empowering the Commissioner to regulate the establishment of new highway grade crossings be made more comprehensive and strin-

Corrugated Fire-Boxes for Locomotives.

A paper on "Locomotive Boilers" was read by Mr. Cornelius Vanderbilt at the Junior Meeting of the American Society of Mechanical Engineers, last Tuesday evening, at the house of the Society, 12 West 31st street, and brought out a large attendance. It was announced by the Chair that the title of the paper was more comprehensive than the author would have sanctioned had he been able to communicate with the Society and modify the title before announcements were made. That is, the specific purpose of the paper was to describe and illustrate the Vanderbilt boiler, and to accompany it with enough other matter to explain its conception and make possible an intelligible statement of economic results. This purpose was well carried out,



Atlantic Type Compound Locomotive—Baltimore & Ohio Railroad.

Netting, size of mesh or perforation.....	2 1/2 x 2 1/4 in.
Stack, diameter.....	18 in.
Stack, height above smoke-box.....	3 ft. 4 in.

Tender.

Type.....	8-wheel
Tank capacity for water.....	5,000 gallons
Coal capacity.....	8 tons
Kind of material in tank.....	Steel
Thickness of tank sheets.....	5-16 in.
Top, bottom and inside, 5-16 in. Outside, 1/4 in.	
Type of under-frame.....	Wood
Type of truck spring.....	Barber
Type of truck wheels.....	36 in.
Diameter and length of axle journals.....	5x9 in.
Distance between centers of journals.....	76 in.
Diameter of wheel fit on axle.....	6 1/2 in.
Diameter of center of axle.....	5 1/2 in.
Type of truck bolster.....	Barber
Length of tender frame over bumpers.....	22 ft. 2 in.
Length of tank.....	8 ft. 8 in.
Width of tank.....	5 ft. 5 in.
Height of tank, not including collar.....	6 ft. 1 in.
Height of tank over collar.....	6 ft. 1 in.
Type of back drawhead.....	Buckeye automatic
With or without water scoop.....	With

Michigan Railroad Commissioner's Annual Report.

Railroad Commissioner C. S. Osborn, of Michigan, has made up the 28th annual report of his office. The first subject considered is the record of persons killed and injured, the total number of casualties in the state during the year 1899 having been 793, an increase of 197 over the preceding year. The Commissioner recommends legislation to prevent the use of railroad tracks as public thoroughfares, especially in large towns and cities.

"Very satisfactory progress" has been made during the past year in the separation of grades at crossings, especially those used by electric railroads. The Commissioner strongly disapproves grade crossings, and in consequence of this the promoters of new electric roads now try to lay out their lines so as to avoid crossing steam roads at grade. No new grade crossings of electric roads

gent; that the State Railroad Department be empowered to regulate the construction of electric railroads; to control the crossings of electric lines with each other as well as with steam roads; to require fencing where necessary and perhaps to order the adoption of suitable train despatching. The railroad tax laws of the state are unsatisfactory and the Commissioner recommends that the Legislature revise the law. Even if the present plan is continued in force several clauses ought to be made clearer and what is the income of a railroad in the state of Michigan should be unmistakably defined.

The total length of railroad in the state is 7,929 miles, equal to 14.1 miles per 100 square miles of territory and to 32.8 miles per 10,000 inhabitants. The railroads of the state have been thoroughly inspected during the year and this subject is reported on by the Mechanical Engineer. There are 128 interlocking plants in the state, 12 more than were shown by the previous record. The general condition of these plants has been much improved. The railroads are giving attention to the protection of stations by semaphore signals. The law should empower the Commission to keep all overhead obstructions at least 22 ft. above the rails. It is often difficult to determine the ownership of overhead wires; the law should require poles to be marked. It is recommended that Michigan enact a coupler and air-brake law in harmony with the Federal law on this subject. Other recommendations are that the Commissioner be empowered to require the construction of depots, that the Legislature require locomotive engineers to be licensed and that bell cords be required on mixed trains.

The Legislature limits the Commissioner's annual report to 300 pages, and this prevents the publication in full of the annual reports of the railroad companies. As these reports have "a peculiar and important interest to very many persons" the Commissioner recommends the immediate amendment of the law, for publicity is one of the most important regulators of corporations.

the paper being a comprehensive summary of the vital points of a very broad subject.

The reading of the paper was accompanied by the display of a large number of lantern slides showing something of the very early locomotive boiler design, and its development to the time when systematic staying, crown bars, radial stays and other detail features, became recognized necessities. These features led naturally to the consideration of various boiler sheet shapes, the Wootten type of fire-box being among those most conspicuously exhibited. Mr. Vanderbilt sketched briefly various efforts to use the cylindrical fire-box, mentioning in this connection attempts and failures of German builders, and referring to the double fire-box as used in the Strong engine.

In considering his own design a series of erecting cards, sectional views and photographs, showing work done by the Baldwin and Schenectady Locomotive Works, for the New York Central, the Union Pacific and Baltimore & Ohio were exhibited. The net impression of the observer of these designs is that the result, as a whole, is symmetrical, and in many respects fine. Data of tests show a decided margin to the good for engines having the cylindrical fire-box, both in rate of evaporation and in ultimate fuel consumption, a saving of 9.4 per cent. being credited in one instance to a freight engine of the New York Central, having the Vanderbilt boiler and tested against an engine of the same class having an ordinary boiler. The total repairs to engine 947 (see *Railroad Gazette*, Sept. 1, 1899) for one year, with a mileage of 54,650 miles, was \$1,456.52, this sum including some incidental repairs that have no direct connection with boiler considerations. The paper brought out an animated but brief discussion.

The Russians are said to be mounting a number of 3-in. guns on platform cars for the defense of the Chinese Eastern Railroad.

Fast Runs.

The table published herewith is one which appears in the 1901 edition of *Modern Locomotives*, which has just been issued. It brings down to date the record given in the larger table, published in the earlier edition of the book, and in the *Railroad Gazette* of June 11, 1897. The present table does not show any higher speeds than were

the Commission to serve without pay. It is said that these bills for another commission are calculated to waste time, if not to kill the project for a memorial bridge between Arlington and Washington altogether. The *Washington Star* quotes "a recognized authority on bridge architecture" as saying that the Keller design has not yet passed beyond a mere study; that no stress sheets have been shown for it, and no analysis of the

of expense and also in regard to the more or less divided responsibility entailed.

The London & North Western has put to work a number of experimental plants of different power systems, and after exhaustive trials has chosen the Webb & Thompson electrical system, of which, by the courtesy of Mr. Webb, of Crewe, we are enabled to give a brief description, with illustrations prepared

Fast and Unusual Runs Made During 1897-1900.

From the new edition of *Modern Locomotives*, published by the *Railroad Gazette*.

Date.	Railroad.	From	To.	Dist'nce, Miles.	Time, h. m. s.	Speed, Miles per Hour.	Stops.	Net Speed, Miles per Hour.	CARS.		Weight of Train, Pounds.	LOCOMOTIVES.						Builder.	Date Reported in RAILROAD GAZETTE. "S" Means Special Train.		
									No.	Weight, Pounds.		Name or Number.	Type.	Cylinders.	Drivers.		Weight on Drivers, Pounds.			Engine Weight, Pounds.	
															No.	Diam., Ins.					
Feb. 15, '97	Burlington	Chicago	Denver	1,026	18:52:00	54.06	33	58.7	1	63,450	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Feb. 26, '97, S
Mar. 11, '97	Char. & Sav.	Cent. Junc.	Ashley J.	102	1:40:00	61.02	1	72.0	1	312	.....	312	8 W.	17 x 24	4	64	57,000	90,000	Rogers	.....	April 2, '97, S
Apr. 9, '97	Atlantic Coast L.	Florence, S.C.	Rocky Mt.	172.2	3:00:00	57.70	7	64.6	5	151	.....	151	Atlantic	19 x 24	4	72	76,000	129,620	Baldwin	.....	.....
Apr. 21, '97	Lehigh V.	Alpine	Geneva Jc.	44	0:33:00	80.0	0	80.0	4	668	.....	668	.....	.....	.....	.....	.....	.....	.....	.....	.....
July 2, '97	Atl. City (P. & R.)	Camden	Atl'ntic City	55.5	0:48:00	69.37	..	.....	5	320,300	.....	1,027	Atlantic	13 1/2 x 26	4	84	78,000	143,000	Baldwin	.....	July 1, '97
July 14, '97	P. Ft. W. & C.	G. R. & I. Jc	Colehour	55.5	0:46:30	71.60	..	.....	6	628,587	805,537	147	8 W.	18 x 24	4	68	65,400	103,600	P. R. R., 1891	.....	Aug. 27, '97
July 16, '97	Union Pacific	Evanson	Omaha	132.5	2:15:00	58.8	3	62.1	6	628,587	805,537	147	8 W.	18 x 24	4	68	65,400	103,600	U. P. R.R.	.....	Oct. 22, '97, S
Aug. 3, '97	"	N. Platte	Cheyenne	291.0	5:35:00	52.1	..	62.60	3	264,775	491,608	800	8 W.	19 x 24	4	69	81,000	119,600	.....	.....	Dec. 17, '97
Nov. 29, '97	"	Council Bluffs	Omaha	519.0	9:19:00	55.7	..	62.50	3	276,000	512,100	1,802	10 W.	20 x 24	6	69	103,000	131,200	.....	.....	Dec. 17, '97
Dec. 4, '97	"	Sidney	Omaha	414.2	7:12:00	57.5	10	3.7	3	276,000	501,500	888	8 W.	19 x 24	4	69	81,000	119,600	.....	.....	Dec. 17, '97
Dec. 13, '98	Midland (Eng.)	Amphill	Jersey City	0.75	0:00:30	90.0	..	59.60	3	546,000	782,100	1,800	10 W.	20 x 24	6	69	103,000	131,200	.....	.....	March 4, '98
Feb. 13, '98	Erie	Susqu'anna	Hornetville	423.0	7:30:00	56.4	..	61.65	3	.....	.....	500	.....	.....	.....	74	.....	.....	.....	.....	Feb. 18, '98, S
June 16, '98	Wabash	Tilton	Granite City	140.0	2:21:00	59.6	2	61.65	3	360,000	610,000	601, 602	Atlantic	19 x 26	4	73	83,450	157,900	Baldwin	.....	S. Feb. 18, '98, S
Aug. 5, '98	Atlantic City	Camden	Atl'ntic City	55.5	0:44:45	74.4	..	74.4	6	378,700	607,700 est.	1,028	"	13 1/2 x 26	4	84	76,400 est.	143,000 est.	Baldwin	.....	July 24, '98
Aug. 20, '98	"	"	"	55.5	0:46:45	71.2	..	71.2	7	437,700	666,700 est.	.....	8 W.	19 x 24	4	75	78,000	125,600	Sch. L. Wks.	.....	.....
Sept. 16, '98	Chic. & N. W.	Chicago	Omaha	493.0	9:29:00	52.0	15	.....	4	307,500	530,600	.....	8 W.	19 x 24	4	75	78,000	125,600	Sch. L. Wks.	.....	Sept. 30, '98
Jan. 2, '99	Chic., B. & Q.	Omaha	Chicago	500.2	8:43:00	57.38	..	.....	4	378,000	597,200	1,512	Mogul	19 x 24	6	69	106,500	125,000	Rogers	.....	May 5, '99
Apr. 23, '99	Chic., B. & Q.	Clyde	Burlington	197.3	3:04:00	64.33	2	67.26	4	378,000	631,450	1,591	Class P.	13 1/2 x 26	4	84	85,850	150,050	Baldwin	.....	July 14, '99
June 28, '99	"	Mendota	Riverside	72.0	1:02:00	69.67	0	.....	4	378,000	631,450	1,591	Class P.	13 1/2 x 26	4	84	85,850	150,050	Baldwin	.....	Aug. 4, '99, S
July 9, '99	Del., L. & W.	East Buffalo	Transfer	104.0	1:30:00	69.30	..	.....	8	.....	.....	16	.....	20 x 26	4	78	85,800	.....	Schenectady	.....	July 28, '99
July 19, '99	Vandalia	Clayton	Transfer	18.0	0:14:00	77.00	..	.....	8	.....	.....	16	.....	20 x 26	4	78	85,800	.....	Schenectady	.....	Aug. 4, '99, S
July 22, '99	Atlantic City	Camden	Atl'ntic City	55.5	0:51:15	65.00	0	65.0	8	.....	725,700 est.	.....	.....	.....	.....	.....	.....	.....	.....	.....	July 28, '99
July 31, '99	W. J. & S. (Penn.)	"	"	58.3	0:50:30	69.30	0	.....	8	526,600	.....	269	Class E1	21.5 x 26	4	80	.....	.....	.....	.....	Aug. 18, '99
Oct. 7, '99	Penn. W. Pittsb'g.	Ft. Wayne	Chicago	148.3	2:50:00	52.30	9	57.0	6	688,857	899,757	278	Class G3	19 x 24	6	68	112,550	138,000	Ft. W. Shp., '93	.....	Nov. 10, '99
Oct. 14, '99	Wabash	Tilton	Granite City	176.6	2:47:30	63.30	4	66.0	4	360,000	610,000	601	Atlantic	19 x 26	4	73	83,450	157,900	Baldwin	.....	Dec. 1, '99
Nov. 22, '99	L. S. & M. S.	Buffalo	Cleveland	183.0	3:25:00	.....	3	53.50	8	.....	.....	601	10 W.	20 x 28	6	80	133,000	.....	Brooks	.....	Dec. 1, '99
Dec. 5, '99	Chic., B. & Q.	Mendota	Chicago	83.0	1:10:00	65.52	..	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mar. 27, '00	Atch., T. & S. F.	Los Angeles	"	2,228	58:00:00	38.55	..	41.71	2	148,900	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Apr. 13, '00, S
Apr. 30, '00	Chic., B. & Q.	Huntington	"	205.8	3:23:00	60.80	3	65.50	4	.....	.....	1,510	Mogul	19 x 24	6	69	106,500	125,000	.....	.....	May 11, '00
July 9, '00	N. Y. C. & H. R.	Rochester	Syracuse	80.7	1:25:00	56.70	1	.....	7	689,400	.....	903	8 W.	19 x 24	4	84	84,000	124,000	N. Y. C.	.....	.....

given in the earlier record, and the significance of the items here given is due rather to the weight of the trains, or the length of the runs, or the regularity with which high speed has been maintained. The greatest progress during the past three years has been that made in uniform high-speed service, as, for example, that on the Atlantic City Railroad, several times noticed in the *Railroad Gazette*, where trains of five and six cars have been run 55 miles, every day for two months, at 64 miles an hour and faster. Records of this kind have been made, also, with trains of more than six cars. The development in Europe during the past three years has been almost wholly in the increase in the number of fast regular trains, as frequently noted in the *Railroad Gazette* (April 8, 1898; April 7, June 9, July 21, August 18, Nov. 10, Dec. 1, Dec. 22, 1899; Sept. 24, Sept. 28, 1900).

Reports of Railroad Building.

The table below shows the miles of railroad built in each of three calendar years as reported by three different authorities. Poor's Manual is issued in August, and reports to the end of the preceding December. The two weekly journals issue a preliminary report in the last week of December and a final report in January or February. Poor's figures for any one year are sometimes corrected the next year. It follows that we must accept Poor as the final authority, and it is satisfactory to see how close the early reports of the two journals are to this authority. The Interstate Commerce Commission does not report new construction, but net increase, and this is for the year to June 30. Therefore, the Commission figures are not comparable with those below.

Miles of Railroad Built in			
	1897.	1898.	1899.
Poor's Manual	2,161	3,199	4,524
Railroad Gazette	2,109	3,265	4,569
Railway Age	1,880	3,083	4,588

The Memorial Bridge at Washington.

Bills have recently been introduced into the Senate by Mr. Hawley and in the House by Mr. Henry (both of Connecticut), providing for the appointment of the Memorial Bridge Commission of ten persons to examine and select one of two designs, that recommended by the board of engineers, U. S. Army, which was designed by Prof. W. H. Burr, and the "design prepared by George Keller, of Hartford, Conn." the board to report its selection at this session of Congress. The bill further provides that the construction of the bridge and its approaches shall be placed in charge of the architect and engineer whose design is adopted, subject to the general supervision and approval of an officer of the Government to be appointed by the Commission. The Commissioners of the District of Columbia, the chairmen of the Senate and House Committees on the District are to be ex-officio members of the Commission, which is to be completed by five citizens to be appointed by the President and confirmed by the Senate—all the members of

engineering features has been made in any way. The Keller design was not included in the plans considered by the board of Army engineers and described in the *Railroad Gazette* of April 20, 1900, page 248. (See also Dec. 14, 1900, page 831.)

The Webb & Thompson Electric Switch and Signal Apparatus.

There can be no question as to the desirability, if not the necessity, of working switches and signals by power,

from photographs. These views show a 59-lever frame in one of 10 signal cabins at Crewe which will contain altogether about 1,000 levers.

Fig. 1 is a view of the interior of the signal cabin, showing how compact this comparatively large frame is and in what a small space it can be fixed. The levers, it will be noticed, are in two tiers, the upper tier being as a rule used for switch movements, and the lower for signal movements. These levers are manipulated in the same way as an ordinary mechanical lever. Only the levers are placed in the upper part of the signal cabin, the interlocking, electric switches, etc., being placed in the



Fig. 1.—Webb & Thompson's Electric Switch and Signal Machine.

Note.—The interlocking (mechanical) is beneath the floor.

especially at stations involving the movement of a large number of levers; not only to relieve the signalman of the severe physical exertion necessary with the manual system, and to enable him to more closely watch train movements, and the position of the points and signals he is working, but also to avoid the necessity of having so many men in a signal cabin, undesirable on the score

lower part, where adjustments or repairs can be made without interfering with the work of the signalman.

Fig. 2 shows the lower floor of the cabin with the interlocking, the circuit closers and the check locks. The interlocking is of the well-known tappet type in miniature, and the electric switches or circuit closers and check locks are illustrated separately by Figs. 3 and 4.

Fig. 3 is the electric switch by means of which the current is transmitted from the supply source to the switches or the signals. The contacts are of carbon, and the whole is so arranged that in case of failure the switch can be removed and a new one inserted in its place in a few minutes. The life of these switches has not yet been ascertained. Switches have, however, been in use for over 12 months, and so far show but little wear.

Fig. 4 shows the check lock. This is provided to prevent the complete movement of the lever in the signal cabin until the movement of the switch points is completed and the rails themselves bolted, when a current is returned from the switch to the magnet of the check lock, which is energized and the pawl (seen in the illustration) withdrawn, allowing the projecting piece on the rod attached to the lever to pass, thus enabling the movement of the lever in the cabin to be completed. These check locks are provided for switch levers only.

Fig. 5 shows a facing-point. On either side will be seen the covers of the cast-iron boxes containing, in the one case, the switch movement and, in the other case, the signal detector electric switches, which in addition to the check lock just described, are provided to insure that a signal reading over these switch points cannot be lowered unless the points are accurately in position and bolted. It will be noticed these covers are level with the upper face of the sleepers and ballast; thus no obstruction is caused and a level footway is made for workmen.

Fig. 6 shows a switch movement removed from the box. The electric motor is worked by a current of 20 amperes at 100 volts. The movement of the motor is transmitted to the switch movement cam-wheel by means of a worm and worm wheel, clutches being employed to disengage the motor as soon as the switch movement is completed. The motor itself runs free until the current is cut off. The motor is so speeded that the reversing of a switch is done in three seconds.

Fig. 7 shows a signal post and a ground disk signal, and Fig. 8 shows the signal movement. This is the simple magnet movement adopted in the Timmis automatic electric signaling which is so successfully worked on the Liverpool Overhead Railway.

To carry the current from the lever in the signal cabin to the switches on the ground six wires are employed, and these are made up in a single cable about $\frac{3}{4}$ in. in diam., which is laid down in a groove in rough wood trunking, this groove being filled up with pitch after the cable is laid in.

The signals are worked by two wires, one wire being

a common return for several signals. These signal wires are dealt with in the same way as the switch cables, excepting in the case of distant signals, where the wire, if it does not form an obstruction, is carried on low stumps.

The officers of the London & Northwestern have decided in favor of electrical apparatus because of the easy adaptability of this power. It is the power required for lighting purposes, and will be largely used for working capstans, cranes, and baggage lifts; and it can generally be obtained from local supply companies, thus making it unnecessary for a company to build its own plant.

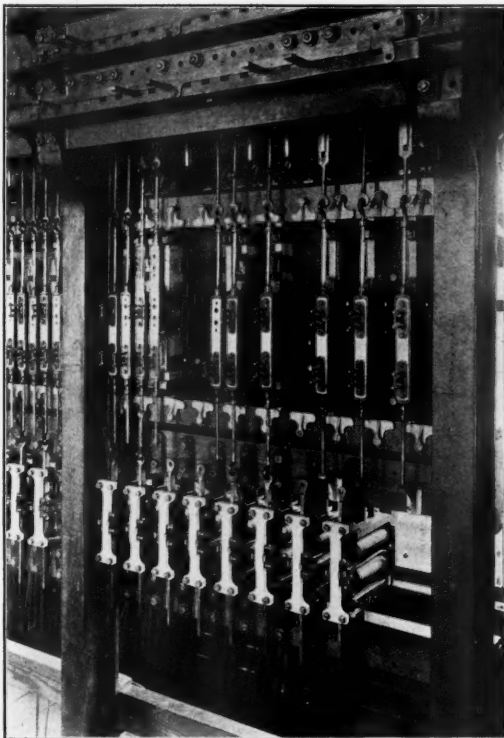


Fig. 2.

Foreign Railroad Notes.

A new regulation in Belgium is that there may not be more than 25 cars and 60 axles (behind the tender) in any passenger train:

The Prussian State Railroads have imported a small quantity of cross ties of the South American quebracho wood, concerning the durability of which marvelous tales are told.

Transport reports that in connection with the low pressure pneumatic interlocking to be put in by the London & Southwestern at Basingstoke some automatic block signals will be introduced.

The leading Belgian newspaper, the *Independence Belge*, complains bitterly of the management of the Belgian railroads, in an article which begins with these words: "The disorder on our railroads grows worse and worse, and it is really high time to make energetic efforts to put an end to what has become an actual scandal." Overcrowded trains, insufficient cars, rolling stock out of repair are among the complaints made and the public is called upon to rain law-suits on the management (the State) for damages suffered. Belgium, more than any other state, is a coal and iron country, and has had an extraordinary traffic for a year or more, and this has doubtless exceeded the facilities of its railroads. Whether these have done all that they could is a question we must leave to the Belgians.

The Germans have built a railroad in their colony in Southwest Africa which extends from Swakopmund eastward into the interior 120 miles, in a country very little troubled by Europeans, and apparently not much by Africans. There is one passenger train weekly in each direction, which takes 14 hours to make the trip, stopping an hour for dinner at the half-way station, and about 10 minutes at each of the other eleven. There is a freight train daily, and this halts overnight at the midway station, but while on the road runs about as fast as the passenger train—which ought not to be difficult. The present interior terminus is about 4,200 ft. above the sea, the line passing through a rough country. There is hope of developing some mines in the interior when the road has been extended 115 miles further, through a less difficult country, with a rise of about 1,000 ft. The road is worked by a troop of the German railroad regiment.

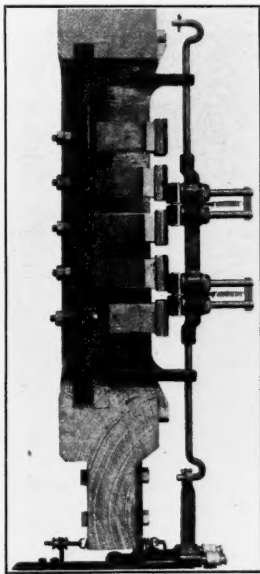


Fig. 3.

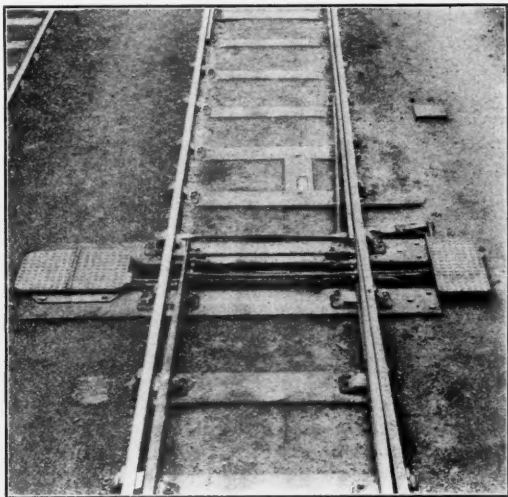


Fig. 5.

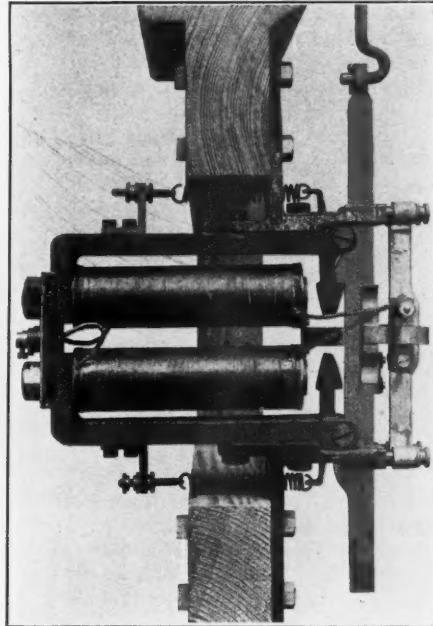


Fig. 4.

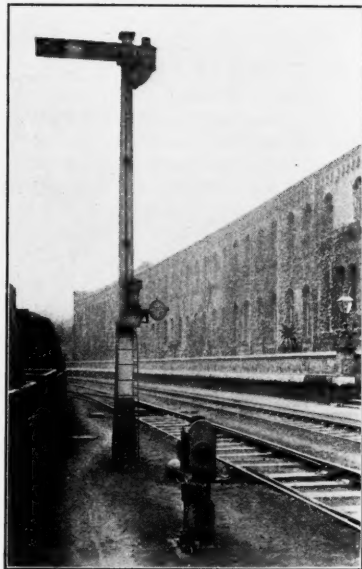


Fig. 7.

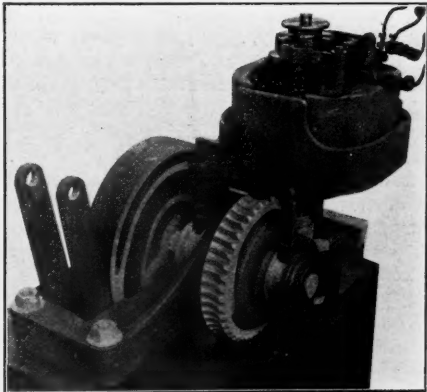


Fig. 6.

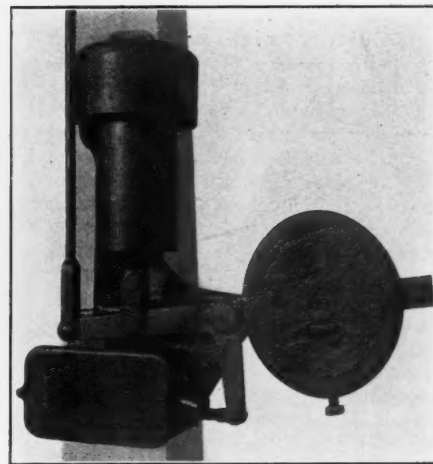


Fig. 8.

WEBB & THOMPSON'S ELECTRIC SWITCH AND SIGNAL APPARATUS.



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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

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The subject of automatic couplings has become a burning one in Germany and elsewhere on the continent. In several countries of Germany and in Austria experiments are made with American automatic couplers, chiefly of the Janney type. The question is complicated there by the present style of spring side buffers and screw couplings, but the reports so far made, after trials lasting for months, are generally favorable. The automatic couplers have been found practicable in connection with present side buffers. The matter has gone so far that the German Railroad Union, with 50,000 miles of railroad and about 570,000 freight cars, has formally declared that the present method of coupling must give place to something better, and has recommended that the tests of automatic couplers be continued with a view to adopting a uniform type applicable to existing cars and to be used on all new ones; which, however, for some time to come, must also have the old appliances, that they may be used with the old cars. It is estimated that distributing the changes over a period of 12 years, the whole stock may be equipped with automatic couplers at a cost of about \$3,700,000 a year. And the importance of the change is believed to justify this expenditure.

Mr. W. H. Elliott has gathered some interesting statistics concerning 141 derailments which have occurred at derailing switches, and his comments on this record may be found in another column. His paper is a statement of his views less fully expressed at the St. Louis meeting of the Railway Signaling Club in November. It does not appear how long a time or how many miles of road or train miles are covered by this record, but assuming that the time is even as long as ten years, we should be inclined to urge, if we were to take up the discussion, that reports of a larger body of experience will be needed before these statistics can be made to yield a satisfactory lesson. Again the quality of the discipline is an important factor in any comparison which is to cover a wide range. Mr. Elliott speaks of old and careful engineers who make very serious blunders; but this by itself does not mean much. Almost any superintendent will claim that the discipline of his engineers is better now than it was five or ten years ago; what light does the record show on this feature of the subject? This will be a useful question to ask at the Chicago meeting. The essence of the argument presented at St. Louis by Mr. Elliott's opponents was that some roads do avoid collisions at crossings (without derailleurs); that they maintain a satisfactory record for safety. This is equivalent to the assertion that the discipline of such roads is better than that of the roads cited by Mr. Elliott; so the only way to make an intelligent comparison will be to get a good account of the discipline

on roads of both classes. This would involve also a statement of the number of crossings, number of trains and number of engineers. If those who advocate doing without derailleurs can make any showing at all they ought to be warmly encouraged; for their theory has two strong points in its favor; first, the omission of the derails saves money, care, and the risk of accident due to possible defects in the derails themselves, and, second, every improvement in discipline on one point makes it easier for the superintendent to elevate the discipline of his men in other respects. A superintendent is justified in playing almost any trick on himself if he can thereby hold his attention more closely to this last point. We hope that a good mass of experience will be brought out at Chicago, and expect a profitable discussion; but it is to be borne in mind that the question will probably always elude settlement, because there will be no agreement as to the premises; almost everybody will approve derails at some danger points, while nobody will ever put them in at all danger points. Who wants a derail at every cross-over?

The official abstract of the annual report of the Interstate Commerce Commission has been given out for publication and something of it appears on another page. The Commission repeats its request for more laws to help control the railroads. It appears that the railroads have succeeded in raising rates directly and by changes in classification and that "under the conditions now existing it is inevitable that frequent discriminations should occur and endless acts of injustice be committed. Theoretically, it

Name of road.....	C. & N. W.	B. C., R. & N.	P. R. R.	B. & O.	C., B. & Q.
Type.....	Northwestern	Chautauqua	Atlantic	Atlantic	Prairie
Builder.....	Schenectady	Brooks	P. R. R.	Baldwin	C., B. & Q.
Heating surface, tubes, sq. ft.....	2,817	2,386	....	2,513	1,937
Heating surface, fire-box, sq. ft.....	199	156	....	150	139
Heating surface, total, sq. ft.....	3,016	2,552	2,278	2,663	2,076
Fire-box, length, in.....	102 1/2	90 1/4	....	102	84
Fire-box, width, in.....	65 1/4	74	....	60 1/2	72
Grate area, sq. ft.....	46.3	45.3	49.0	42.5	42
Heating surface per square foot of grate, sq. ft.....	65	56	48	63	49

is possible for each road to observe its published schedules in every particular, but this in many cases must be done, if done at all, only at the loss of needed traffic, unless all rival roads with equal strictness and honesty conform in like manner to their published rates. The idea of public regulation implies certain standards of correct conduct to which all carriers shall conform. It also implies some measure of supervision and control over these subject to its requirements, to the end that these standards may be observed and practices made to conform thereto. This, without doubt, is inconsistent, to some degree at least, with actual and constant competition as that term is commonly understood." It appears that great combinations are going on and that "the danger lies in the fact that the only check upon the rate is thereby removed. Hitherto competition between carriers has kept down the price of carriage. If that is taken away nothing remains except the force of popular opinion and the feeble restraints of the present law, which are of little effect when directed against slight and gradual advances. It will lie within the power of two or three men, or at most a small group of men, to say what tax shall be imposed upon the vast traffic moving between the East and West." Many times we have expressed regret that the Interstate Commerce Commission does not use its great influence with the people, with Congress and with the railroads to create a body of public opinion and to bring about the laws that shall help rather than hinder the railroads in the vital work of keeping reasonable, uniform and stable rates and of destroying discrimination. All of the best men in railroad work know that this is the great end to be sought—that it is really vital, as we say. Many of them are working steadily towards this end and many others feel that this end can probably only be reached by actual concentration of ownership. They feel that any other hope has been destroyed, largely through what the Interstate Commerce Commission has done or has failed to do. We need not now go again over the ground of this ancient debate. There are men on the Commission who understand that the railroads are not public enemies, that if the Commission and the railroads had worked together for 14 years we might now be much further along towards the traffic millennium, and that much of the argument presented in the synopsis of their report is specious; but the body of the Commission seems still to dwell in the atmosphere of 15 or 20 years ago. It is an unfortunate situation, but the railroads are not ruined nor is the nation ruined. We shall pull through. The way will be slower, however, and more costly than it need be and than it would be if the people and Congress were more wisely guided.

Wider Fire-Boxes.

The new Atlantic type passenger locomotive for the Baltimore & Ohio, shown in this issue, is another good example of a wide fire-box engine with the cab at the rear. While a few are disposed to think that keeping the engineman and fireman together is not of great importance there is nevertheless a strong inclination toward this practice. Possibly the introduction of wide grates has been retarded by the idea that their use necessarily involved a separation of the enginemen, but however that may be, the use of wider grates for bituminous coal has made marked progress since it was shown that the cab can be kept at the rear and a deep and wide fire-box can be got with engines having trailing wheels. That the advantages of more suitable grates for bituminous coal are being realized is well shown by the number of wide fire-box Atlantic type engines now being built, and in spite of the inherent objections to trailing wheels. The up-to-date engine must now have a wide fire-box.

In considering wide fire-box engines for soft coal two questions arise at once as to what is a sufficient depth of fire-box and what grate area is needed. Obviously ideas may change but for the present at least there seems to be a well defined opinion that a fire-box suitable for soft coal should at least be deep enough for a brick arch with still greater depth if the design permits. The wide fire-box engines recently built with rear cabs show best the opinions of their designers as to the grate area, and as might be expected there is considerable variation as shown by the table.

It will be seen that in large engines for passenger and fast freight service there is a foot of grate provided for from 48 to 65 sq. ft. of heating surface, which may be compared with 80 to 85 for recent large passenger engines with narrow fire-boxes. Probably the best proportions for the ordinary run of soft coals is one foot of grate for from 50 to 55 sq. ft. of heating surface. At any rate the indications are that engines with such grates are showing fuel savings of from 15 to 20 per cent., which is the important thing for roads which cannot afford to do much experimenting.

Some European Notions on Car Lighting.

We have lately published abstracts of the two reports made to the International Railroad Congress on the question of car lighting, these being the last of a long series of reports which we have received and printed at greater or less length.

The reader will perhaps have noticed that in the matter of car lighting the experience of the United States was apparently quite unknown to the reporters. This suggests the queer findings of the Third Section of the Congress on the question of automatic block signals concerning which we wrote recently. Notwithstanding a very able and full report on the subject by Mr. Carter, the long and extensive use of automatic signals in the United States was entirely ignored and the Section could not arrive at any opinion or recommendation until automatic block signals had been extensively tried in Europe, where we suppose the laws of nature are quite different from those which govern this continent.

Similarly the experience of the United States in car lighting is ignored, and yet in this branch of the railroad art also we have long led the world. Years ago we replaced candles and lard oil lamps by kerosene lamps and gradually developed lamps of remarkable power and efficiency. Years ago we took up also the system of lighting by compressed oil gas, which is of German origin, and we carried that art to higher perfection than it has yet reached in the land of its birth; that is, our gas lights are superior in power and brilliancy and beauty of design to those used in any other country. On this continent also the experiments with electric lighting have been more varied and extensive than anywhere else. Where other countries have lighted a car we have lighted trains and where other countries have lighted trains we have lighted scores of trains. Nevertheless the reporters on car lighting appear not even to have discovered the United States. Of course we are not complaining of this, for the more zealously that sort

of spirit is cultivated in Europe the more certain are we to take the lead in competitive trade.

The reader will have observed doubtless, also, that the writers of both of the reports make their special point as between compressed gas and electricity on the question of their relative safety. We have often pointed out in these columns that this is not a reasonable or wise contention, because lighting by compressed gas is, practically speaking, entirely safe, and indeed we judge that it is quite as safe as lighting by electricity. In either case the danger of explosion or fire is so remote that it need not enter into the choice of a lighting system.

Lighting by compressed oil gas has been done on the railroad cars in this country since 1866 and to-day there are 16,000 cars running on this continent so lighted. We have heard of but one car having been destroyed through a fire or explosion caused by this gas, and we have never heard of a train wreck set on fire by gas; that is, we have heard of such occurrences, but when they were traced down we have found that they were like the very frequent railroad accidents in which "the air-brake failed." We have found that the fire was set from some other source. As in the one case suggested above, it has happened that an explosion has occurred because gas has leaked into a small and confined space and has been ignited by a match or other flame, but we do not remember that a life has been lost or a serious injury caused by any such explosion. Years ago the practice of putting the pressure regulator in the saloon was abandoned and gas under high pressure does not get inside the car in modern practice. Consequently leaks into a confined space are practically unknown and are entirely unnecessary.

On the other hand, cars have been set on fire by electric wires, and within the last two years a number of trolley cars have been destroyed by fire set by electric current, not lighting current to be sure, but still electric current. Of course the fire insurance companies could give us long lists of fire losses in buildings, caused by electric wires as well as by explosions of gas. But these are unnecessary, and our point is that the element of relative safety should be eliminated entirely from this discussion of the relative merits of the two systems of car lighting. We doubt if practical railroad men attach any importance to the danger notion, but it may cause some uneasiness to the uninformed travelers.

Consolidation of the Anthracite Coal Roads.

The control of the Central of New Jersey by the Reading is another step in that railroad consolidation which has been in progress for the past two years. Formal announcement was made at noon, Saturday, by J. P. Morgan & Company of the purchase of a controlling interest in the Central's property and of the offer of the same to the Reading. The offer has been accepted but the terms of transfer have not been made public. The same price, whatever it was, is to be offered to the minority stockholders.

The completion of this consolidation will bring the two systems for the third time under common control. The Central lines were leased to the old Philadelphia & Reading in May, 1883. Under the Reading reorganization the Central was given the option of regaining possession of its roads, of which it availed itself on Jan. 1, 1887. Again, in February, 1892, the Central lines were leased to the Port Reading line of the Philadelphia & Reading, but the courts declared the contract illegal and the Central resumed the operation of its lines on Aug. 31 of the same year.

The Central of New Jersey will add 677.72 miles to the Reading, 343.35 miles of which is owned in full and the rest controlled by lease or majority ownership of the stock. Of this mileage 261.59 is double track and 29.73 miles four track. The capital stock authorized is \$30,000,000, all common, \$27,113,800 of which is paid in. Dividends of 5 per cent. were paid on this stock last year, 4 per cent. in 1899 and 1898, 4¼ per cent. in 1897, 5 in 1896, 5½ in 1895, and 7 per cent. in 1894, 1893 and 1892. The authorized amount of the company's general mortgage is \$50,000,000, of which \$43,924,000 is outstanding. It is 5 per cent. gold, payable July 1, 1897. There are also \$1,530,000 of 4 per cent. equipment mortgage bonds outstanding, payable in 10 per cent. yearly installments on June 1. Of consolidated mortgage 7 per cent. bonds of 1874, there is \$1,167,000 outstanding and due Nov. 1, 1902. The company has also outstanding \$372,800 in 6 per cent. debentures of 1883, which are convertible into stock until 1907, and \$199,100 of 5 per cent. real estate bonds and mortgages. These make a total of \$47,192,900 bonds outstanding upon which the total annual interest charge is \$2,371,000. Besides these there are \$14,141,000 of guaranteed bonds. In 1899, the last full year for which reports are obtainable, the gross earnings were \$15,951,000, and the net earnings \$6,246,000. Out of this was paid \$2,881,000 interest charges, including guaranteed interest, and \$1,961,000 in rentals. After providing for 4¼ per cent. dividends, there was a balance surplus of \$958,000. The gross earnings for the first 11 months

of 1900 were \$13,928,000, a gain of \$220,000 over the corresponding months of 1899.

The Central supplements the Reading as to territory in a most advantageous manner. The two systems touch at a number of points, while there is little overlapping of territory. The Reading is assured the use of the Central's terminal at Jersey City, and, most important of all, perhaps, gains control of the anthracite coal fields tapped by the Central. In this connection should be noted the acquirement of the control of the Lehigh Valley by J. P. Morgan & Co. With the Erie and the Pennsylvania Coal Co. under the same general control, these five interests have a great influence in the anthracite coal situation. These companies carried 53.6 per cent. of the 47¾ million tons of anthracite hauled in 1899. The evidently friendly attitude of the other anthracite carrying companies makes it highly probable that the full control of the anthracite situation, long sought, is at last within sight. Higher prices to the consumer will not necessarily follow. Intelligent direction of the quantity and time of output, and consolidation of sales agencies in cities would alone result in economies of mining, transportation and administration which would insure large increases of revenues without adding to the burdens of the public. And this, if we mistake not, will be the policy. We are officially informed that no operating changes are contemplated.

The five men who are to form the management of the Swiss State Railroads have been chosen after about as much public discussion as if they had been candidates for Congress; but the choice, judging by the careers of the men, has been much more rational than was to be expected. This executive body is called the "general direction," and it is selected by an "executive council" of 47 members, representing various political divisions of the Confederacy. The first chosen of the "general direction," Weissenbach, 59 years old, was a lawyer from 1862 to 1874, and from 1874 to 1896 Secretary and President of the Swiss Central Railroad, which is the first to come into the hands of the State. Since 1896 he has been at the head of the administrative division of the State Railroad Department. Another member, Tschiemer, is 57, and has been in railroad service since 1872, largely as an inspecting engineer for the State. It was objected to him that he had no diploma. The third member, Flury, has always been an engineer, and since 1892 one of the managers of the Swiss Central. At the head of the finance department a bank manager, Dubois, is chosen. He was for seven years at the head of a commercial school. Schmidt, the fifth member of the direction, began life as a Protestant minister, but has been since 1873 in railroad service in the traffic departments, latterly in charge of the freight tariffs of the Swiss Northeastern.

By their charters the French railroads are authorized to charge the fare for 6 kilometers (3¾ miles) for any journey shorter than that distance, and hitherto they have availed themselves of that privilege. Recently, however, the Northern Company and the State railroads have applied the mileage rate at all distances over 3 kilometers, with the result that there has been a very large increase in the travel over very short distances, so much so that the change has evidently been profitable to the railroads. Now the government recommends the other companies to follow suit.

Derailments and Conclusions to Be Drawn Therefrom.*

While the derail has been so often discussed that the arguments have become threadbare, the opinion expressed by so many Signal Engineers, at the St. Louis meeting, that a derail was not needed and the results sought for were to be obtained by better discipline, would lead one to suppose, that, with the signalmen at least, this method was gaining in favor; while the enforcement of obedience to the indication of the signal that is given by the derail was believed to result in more damage and delay to trains than if the derail were not used. . . . The American Railway Association has placed derails among the "adjuncts" instead of among the "requisites of installation." This was necessary if the derail was to be mentioned in any way since a change would be too expensive for those roads which do not use derails.

A record of 141 derailments has been analyzed to classify causes with a view of showing whether the derail was of advantage or not. These are:

1. Train on crossing. Collision would very likely have happened	16
2. Draw bridge open, train would have gone in stream	3
3. Train just passed off the crossing, but not out of interlocking at time of derailment	3
4. Signals set for an approaching train, but not probable that a collision would have happened	11
5. No train on crossing. Derail open. Approaching train not seen by signalman	4
6. Engineer ran by signal. Reason why derail was open not ascertained	29
7. Engineer forgot about signal, did not shut off until derailed. Derail caught and could not be closed	1
8. One train following another closely took indication given to first train and was not able to stop when signal was taken away	1
9. Engineer went by light other than signal lamp	3
10. Train switching. Light collisions would probably have occurred in a few of the cases	42
11. Signal at clear improperly	3
12. Broken red glass	4
13. Mistaken hand signal	3
14. Signalman pulled wrong lever by mistake	5

*A paper by W. H. Elliott (C. M. & St. P.), to be read before the Railway Signaling Club at Chicago, Jan. 15.—Condensed.

15. Signalman took signal away to set up route for another train	6
16. Train parted. Signalman opening derail in front of rear section	2
17. Signalman gave hand signal to train on left hand track against back up dwarf signal. Signalman thought train was on right hand track and that light in home signal, which was clear, had gone out. Crossing torn out	1
18. Cars blown by wind or rolled down grade and off derail	4
Total	141

In the majority of cases but little damage was done to rolling stock or apparatus, the following being the only derailments where the results amounted to very much, or where there was chance of a collision at the crossing.

Under No. 1 several derailments would have resulted in much greater damage than actually occurred had the derails not been used.

A. One derailed train was running so fast that the engine left the ties after rolling 200 ft. on the dirt, finally turned over smashing in the tower. The train to which the signal had been given was running slowly and although the engine had passed the derail, it was flagged by towerman so that it stopped before reaching the crossing.

B. In one instance, two through passenger trains would have come together on the crossing, although not running at high speed.

C. In another, a through passenger train would have cut a local passenger train in two had not the former been derailed, the train rolling to within 20 ft. of the crossing. The engineer was one of the most careful men on the road, but he misjudged the braking power of his train for the condition of the rail.

D. A freight train on a down grade would have come into head end collision with another train on a gauntlet on a bridge if the train running by the home signal had not been derailed.

E. A freight at a junction point would have run into the side of a passenger train if the freight had not been derailed.

Of the trains derailed at a draw bridge when the draw was open:

F. One ran the length of the guard rail on the ties before taking to one side of the track, finally stopping on the bank with the front truck falling in the water.

G. Another train, this one of 50 cars, was derailed and rolled half way to the bridge before stopping.

H. Of the derailments under fourth cause but one that was serious occurred, and in this a brakeman was killed and six or seven freight cars broken up. The investigation brought out the fact that the engineer had lost his bearings and thought he was about two miles from the interlocking. The signalman had just set the signals for another train he knew was approaching but was not due for five minutes. Owing to a fog the headlight of the train derailed did not show to the signalman until the train was within a few feet of the home signal.

J. Under the seventh cause the engineer of a passenger train, running at 40 miles per hour, forgot all about the signals and went off the derail with throttle wide open. The plant had been in service but three weeks. There was snow in the derail points and signalman was down trying to clean out the one on far side of crossing.

Of the derailments from signals at clear improperly:

K. One was a distant signal which had been adjusted in hot weather by taking up all the slack in the down pull wire only. A fall in temperature shortened the wires, pulling arm down. Eight cars off track.

L. A broken stop on a dwarf signal allowing arm to go too far, showing clear light, caused another derailment. Engine off track.

Of the derailments on account of broken red glass not one went off very badly, the trains happening to be running slowly at the time. In two instances the engineer could see the arm in stop position and had very nearly come to a stop.

Considered as a whole the facts show that very many more serious accidents would have occurred if the derail had not been used; and while there was a larger number of derailments with the derail than there would have been of accidents if no derail had been used, the damage to property and loss of life was so much smaller with the derail that it should be considered as a necessary safety device.

If the causes of derailment be considered, it will be seen that while very strict discipline probably would reduce the number of derailments, the reductions, if any, would occur in larger proportion in cases where no derail was needed to prevent an accident than where an accident would have happened if the derail had not been used. To insure that no collision would result there must be no failure of the air-brakes, no mistake in judgment or carelessness on the part of the trainmen or signalmen and no failure of the signals to give the proper indication. Look through the records of the railway service the world over and where will any road be found on which accidents from one or the other of these causes have not occurred. If they do occur the expediency of using a derail resolves itself into a question of damage and delay to trains and the possible taking of life that will occur where a derail was used and where it was not. The record given above, while not covering as large a number of derailments as is to be desired, is yet sufficiently large to be used as an argument in considering the question.

On what roads will the best discipline be found? The roads in England have been spoken of in the Club as being so free from accidents as to make the derail unnecessary, and yet, in the year 1898, two very serious collisions took place at as many different interlockings and resulted in great loss of life besides damage to rolling stock. In

both cases the engineer expected to have the signals cleared by the time the train reached them, but one also made the claim that the brakes did not hold on account of a bad rail. Possibly there are fewer accidents at interlockings in England than in this country, but this, in view of the two spoken of may as well be ascribed to the system of train blocking in use as to good discipline. With the rule in force prescribed by the British Board of Trade, that where one train has been admitted to a block adjoining a junction point or crossing, trains on other approaches must be held one block away until the train admitted shall have passed 1,200 ft. beyond the point where a collision might occur there is little chance of one happening. Where this rule is lived up to, a derail is not necessary, but, as the results show, the rules are disregarded as well as the signals, and accidents result that would have been of a much less serious character had a derail been used.

While the majority of interlocked crossings in the East may not be provided with derails, and accidents may be few or almost none at all, it cannot be denied that they have happened, and serious ones at that. The one at Atlantic City did not occur so long ago, but that it can be taken as an example.

In what stage of human life will discipline be found to keep a man from making a mistake in judgment, or from having an apparently complete failure of his mental faculties? Discipline makes an engineer careful from fear of punishment whether that be in marks against his record or in being laid off, but does it give him greater experience and thereby help him in judging properly so as not to make mistakes? The engineer is more often mistaken in his judgment than careless.

Will discipline prevent an engineer from running into an open draw after the usual stop has been made? This has happened more than once. The knowledge that he would be discharged and might lose his life does not keep an engineer from running off into the river. Where two trains make a stop for a crossing and then run into each other, although in broad daylight and with nothing to prevent one from seeing the other, in what way would discipline be effective in preventing these men from getting together?

Discipline does not guard against the case of a man dying or getting killed on his engine. The engineer of a passenger train on a western road was killed a year or two ago, as the train was approaching a draw bridge over the Mississippi River. The draw was open and but for the bridge tender noticing that the train was coming on at higher speed than usual and hurrying to get the draw closed, the train would have gone off into the river. The fireman had not noticed the engineer's condition until the train was almost on the bridge. Engineer's die suddenly at their posts from natural causes, as occurred the other day on a passenger train, while the train was running at high speed. This may happen while approaching an interlocking.

Should there be any more damage to property or greater danger to life by the use of the derail than there is without it, the argument in favor of strict discipline would bear more weight, but the facts show that there is less damage where the derail is used. . . . The derail, properly located, makes it very nearly a sure thing that two trains will not get together at a crossing, and leaves it, so far as the amount of the damage is concerned, very much a question of the surrounding conditions and of the speed. If not far enough away to prevent the train from fouling the conflicting track, it would only show that the derail was not properly located.

Col. H. S. Haines, President of the American Railway Association for a number of years, said that "a crossing collision should never occur. Either a crossing should be so protected by signals and derailing switches as to prevent the possibility of collision, or every train should come to an absolute stop at a post 50 ft. from the crossing. In that distance a dangerous speed cannot be attained at the crossing, and when a collision does occur the engineer whose engine struck the other train should be held solely responsible."

Uniform Adjustment of Brake-Cylinder Piston Travel.

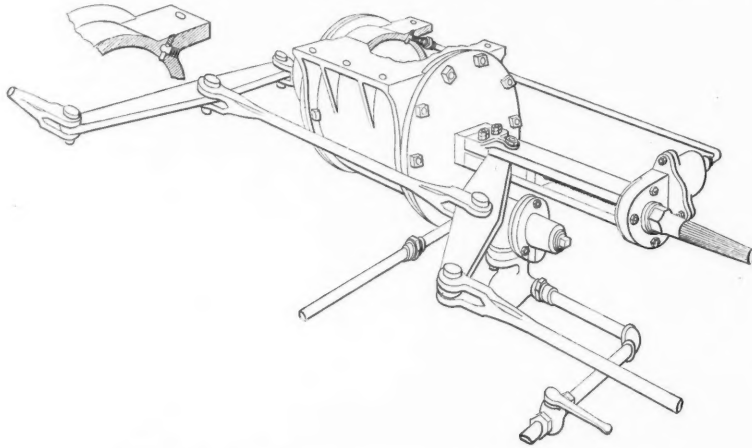
The following extract and illustration are from the Westinghouse Air Brake Company's Bulletin No. 8, bearing the above title:

The great importance of an automatic device for adjusting brake-gear and brake-shoe slack has long been understood and fully appreciated, and many devices have been invented and put on the market to meet the requirements of practice. The exacting conditions of operation, however, have resulted in the abandonment of most of these devices after a brief trial in regular service. Nearly all such devices have depended on the movement of one or more parts of the brake-gear alone or in conjunction with springs situated at some point in the brake-gear, and obtaining the required piston travel has depended upon accuracy in making the brake rods of proper length and in fitting the connections. The yielding of the brake-gear, through permanent extension of rods, spring of the levers and brake-beams, or wear of the connecting pins, has also resulted in permanent changes of the piston travel; while low rail joints, distortion of the relative positions of parts of the brake gear upon curves, etc., has generally resulted in an excessive movement of the slack adjuster, thereby taking up too much slack and shortening the piston travel too much, so as to subsequently cause too high a cylinder air pressure during application of the brakes, or dragging of the shoes upon the wheels during release, or both.

The essential requirement for an automatic slack adjuster is that the same pre-determined length of piston stroke shall be maintained on every car in each application of the brakes. It was not until the movement of the brake-cylinder piston itself was employed to control the operation of such a device that a satisfactory solution

chine, the thickness of the cleats being made such as would be used in practice with each size of nail.

The joints failed through bending of the nails. The load and corresponding slip increased to the maximum load, and then there was a sudden increase of slip with decrease of load. This maximum load was accompanied



The McKee Automatic Slack Adjuster—American Air Brake Co.

of the problem was reached, and, with this principle as a basis, the American Brake Company has recently perfected and placed upon the market an automatic slack adjuster which, it is believed, will meet the most exacting demands. Briefly described, this device, manufactured under the McKee patents, consists of a port through the brake cylinder, at a point where a travel greater than the pre-determined movement of the piston will uncover it suitably connected to a very small cylinder, the piston of which operates to take up only so much slack in the brake-gear that the brake-cylinder-piston travel is reduced by a small fraction of an inch. Whenever the port in the brake-cylinder is uncovered by the smallest excess of travel of the brake-cylinder piston, a small quantity of air from the brake-cylinder enters the adjusting cylinder, and, upon the release of the brakes, the adjustment is so made as to reduce the piston travel again to that normally designed. The device has been entirely encased, so that all dirt and foreign matter are excluded from the operating parts.

Two forms only are necessary to meet all conditions, one for passenger and the other for freight cars. The accompanying illustration shows the slack adjuster as applied to the brake apparatus of passenger cars. It is so designed that it may be attached to a lug upon the front cylinder head, which was formerly designed to receive one of the cylinder levers. In the form of brake-gear generally used in freight car and street car service, the slack adjuster is secured to the car framing, by means of suitable blocking, instead of being attached to the brake cylinder. The position of the small adjusting cylinder is immaterial. It may be either horizontal or vertical, and the connections between the cylinder casting and supporting frame are such that the cylinder casting may be bolted to the attachment frame in any position found desirable, thereby removing any necessity for providing right and left-handed adjusters to meet any peculiar conditions of car construction that may occur in practice. It is believed that the small additional outlay required in the equipment of cars, of all conditions of service employing air-brakes, will be repaid in high efficiency and practical economy of operation, to such a degree that the use of this device will soon be regarded as a practical necessity.

The Strength of Nailed Joints Under Shear.

The results of experiments on the strength of nailed joints under shear are given by Prof. W. K. Hatt in a recent paper before the Indiana Engineering Society. The

by considerable deflection in case of the larger nails. Thus the 10d wire nail in pine did not reach its maximum load until the cleat had slipped 1 1/4 in. Very few nails broke; about 10 per cent. of the larger size. The results of the tests which are given in detail in the paper referred to are made the basis for these conclusions:

Wire nails hold somewhat greater loads than cut nails, when compared on the basis of the strength of one pound of nails.

Cut nails hold somewhat greater loads than wire nails per unit of surface, and per pennyweight.

Nails of small body hold more per pound than nails of large body, both in case of wire and cut nails.

Common nails, both cut and wire, when driven into oak, hold greater loads than when driven into yellow pine in the proportion of 1.5 to 1.

The strength of a joint varies directly as the number of nails used.

The strength per inch of length is constant for 16d nails cut to different lengths.

The best angle of driving is a right angle or nearly a right angle.

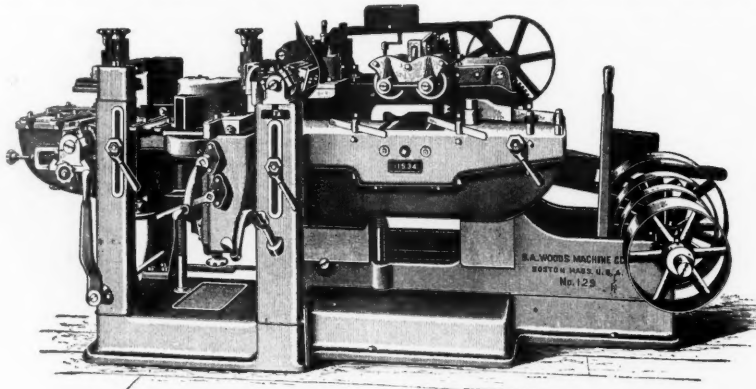
Joints diminish in strength with prolonged soaking.

A decreased efficiency results from barbing the surface of the nail.

The Woods No. 129 Outside Moulding Machine.

Illustrated herewith is a new outside moulding machine made by the S. A. Woods Machine Co. It is equally well adapted to the requirements of large or small shops, having been designed to work materials for high-grade interior finish, sheathing and flooring, as well as mouldings. All working parts are accessible and easily adjusted. The feed is positive, consisting of four driven rolls, the bottom ones running on long self-oiling sleeves instead of the customary short boxes, and pressure is equalized over the entire length of the top rolls.

Both side spindles will swivel in either direction and can be quickly and firmly clasped into position by the improved binder lever. The chipbreaker hinges on a rod on which it can be moved back out of the way to facilitate access to the top cutterhead when setting up. The top cutterhead has an outer bearing supported by one of the outside columns shown in the illustration. This gives a rigid support to the head and table. Two large screws elevate and support the table at locations which relieve the gibs from the usual severe strain. It is also clamped at three different points, making a firm support through



The Woods No. 129 Moulding Machine.

experiments were made at Purdue University and in all about 250 joints were tested, the slip and accompanying load being observed at about 12 different points for each joint. The timber was well-seasoned pine and oak, and various sizes of both wire and cut nails were used. The joints, made of cleats, nailed to blocks of wood, were loaded to destruction in an Olsen 100,000-lbs. testing ma-

its entire length. Attention is directed to the improved form of side chipbreaker and swing pressure shoes; the plates before and after the cut of underhead; convenient location of feed levers, and other improvements, including the Woods patent self-oiling loose pulleys and their patent pneumatic pulleys, which are furnished with each machine.

TECHNICAL.

Manufacturing and Business.

At a recent meeting of the Directors of the Safety Car Heating & Lighting Co., Mr. Julius E. French was made a Director of that company.

On and after Jan. 1 the business of the Q & C Company and the Railroad Supply Company will be operated as one company, under the name of the Railroad Supply Company, with D. S. Wegg as Chairman of the Board, and C. F. Quincy as President; general office, Bedford Building, Chicago; New York office, 106 Liberty street.

Mr. Geo. C. Murray, who has heretofore had the title of Western Sales Agent for the Sterlingworth Railway Supply Co., has been appointed Western Manager of the company, dating from Jan. 1, 1901.

The Canada & Atlantic R. R. is equipping its best trains between Ottawa and Montreal with the Powers temperature regulating system.

O. M. Edwards, Syracuse, N. Y., maker of the Edwards' window fixtures and vestibule platform trap door, will exhibit these devices at the Hotel Imperial, New York City, Jan. 17 and 18. These dates were selected because of the meeting of the New York Railroad Club on the night of Jan. 17. The Imperial is less than two blocks from the rooms of the American Society of Mechanical Engineers (12 West 31st street), where the Club meets. The Edwards window, as used on the Pennsylvania, New York Central & Hudson River and other roads, was described in our issue of Oct. 5, 1900, and the vestibule platform trap door, now in use on several roads, was shown Sept. 7 last.

The Berlin Construction Co., recently incorporated under the laws of New Jersey, with a capital stock of \$100,000, has opened offices at 220 Broadway, New York, and at Berlin, Conn. The company will design and erect all kinds of steel buildings, bridges and structural work, and will also make a specialty of steel concrete construction in its various branches. The officers are: President, D. E. Bradley; Vice-President, George H. Sage; and Treasurer, Seymour N. Robinson. These gentlemen were for several years, previous to its absorption by the American Bridge Co., directors of the Berlin Iron Bridge Co., and resigned responsible positions with the American Bridge Co. to form this independent corporation.

Roger W. Conant, for the past nine years Electrical Engineer of the lines now comprising the Boston Elevated R. R., has resigned to become Manager of the New York office of the Gold Car Heating Co. Mr. Conant is a graduate of the Massachusetts Institute of Technology and is well known to railroad officials because of his writings on subjects pertaining to electrical and mechanical engineering.

Iron and Steel.

Among the recent contracts received by the McClintoc-Marshall Construction Co., Pittsburgh, are a bridge across the Pittsburgh Junction R. R., at Ben Vente, Pa.; a shop 58 x 396 ft. for the Brooks Locomotive Works; also a contract for about 8,000 tons of structural steel for the Marshall Field & Co.'s building, at Chicago. The material for their new plant to be built at Rankin Station, Pa., is being rolled at their works at Pottstown.

Chas. B. Houston, of Chester, Pa., has been elected President of the Tidewater Steel Co., succeeding Geo. H. Stickney, resigned. Mr. Houston has heretofore been a member of the Board of Directors.

The John Illingworth Steel Co. was incorporated in New Jersey last week, with a capital of \$30,000. The incorporators are John Illingworth and Elwood C. Harris, of Newark, N. J.

John Vanderslice, Shop Superintendent of the Keystone Branch of the American Bridge Co., has resigned to accept a position as Superintendent of the Rankin Works of the McClintoc-Marshall Construction Co. Mr. Vanderslice was with the Phoenix Iron Co., bridge department, for 13 years; with the Pottsville Bridge Co. 6 years as Superintendent, and with the Carnegie Steel Co., Keystone Works, four years as Shop Superintendent.

During the month of December the Keystone Branch of the American Bridge Co. made 6,218 tons of bridge and structural steel, possibly the largest record ever made by a single American plant. The largest previous shipment by the same plant was 4,500 tons in May, 1900.

The Carnegie Steel Co. is placing machinery in a new column shop at 33d street, Pittsburgh. The product of this works, 4,000 tons a month, will be exclusively riveted steel columns.

An Electric Locomotive in Italy.

An electrical locomotive, apparently of the accumulator street car order, has been put on a section of one of the great through lines of Italy, between Bologna and Modena, having seats for 28 second-class and 40 third-class passengers. It makes the run of 23 miles in 55 minutes.

Compressed Air Street Cars.

The Rome City Railway, of Rome, N. Y., has for some little time been running four compressed air cars. Four more have now been ordered, and they are said to be very popular.

The River and Harbor Bill.

The River and Harbor bill was reported by the House Committee, on Jan. 5. It carries cash appropriations to the amount of \$22,800,000 and authorizes continuing

contracts for \$37,000,000. The total amount for the completion of projects for which estimates have been submitted approximates \$300,000,000.

The Committee has inserted an important provision creating a board of five engineer officers to pass on all recommendations and surveys. This board, when necessary, will make personal inspection of localities. Surely something of this sort is greatly needed to co-ordinate and balance the claims of innumerable localities.

Draft Gear.

We learn that the steel cars for which the Philadelphia & Reading has contracted with the Cambria Iron Company will be equipped with the Westinghouse draft gear. Those to be built by the Pressed Steel Car Company are not to have the friction gear and the Reading has not made any plans to try the Sessions gear.

Wide Fire-Box Locomotive for Mexico.

The Baldwin Locomotive Works recently built for the Southern Pacific Company, for use on the Sonora Railroad, a 10-wheel locomotive having cylinders 19 in. x 24 in. and a wide fire-box of the modified Wootten type. Mr. H. J. Small, Superintendent of Motive Power, states that a large deposit of anthracite coal has been found in the state of Sonora, Mex., about 60 miles from the main line of the Sonora road, and that the engine was built to burn this coal. Before ordering the engine about 100 tons of the coal was hauled by wagons to Los Angeles and tested. It was found that while the coal was of good quality it would be necessary to have a locomotive with large grate area to burn it. The locomotive is described as being in many respects similar to engines of this general type that are used on the Reading, the Lehigh Valley and other Eastern roads. It has no combustion chamber. Mr. Small states further that one thing demonstrated to his satisfaction by the use of this locomotive is that increasing the grate area, even for bituminous coal, is a step in the right direction and that he finds, from tests made, this engine is more economical with the bituminous coals used in California than are the locomotives having narrow fire-boxes and relatively small grate area.

Oil Fuel Tests in the Navy.

Last week we referred to the stopping of Government experiments with oil fuel on the torpedo boat "Talbot." The Secretary of the Navy has furnished the following information, as quoted from the report of the Chief of the Bureau of Steam Engineering:

"The experiments with oil fuel on the 'Talbot' have been abandoned only on account of lack of officers to properly pursue them, the oil experiments in general hereafter being more conveniently carried on in the experimental boiler room at the Navy yard, New York. Until a fuller demonstration of the practicable serviceability of oil fuel apparatus for torpedo boat use is obtained the Bureau recommends nothing be given out for publication, it being always inadvisable, and often misleading, to publish data of experiments partially completed."

Street Hygiene.

At the International Congress of Hygiene, held in Paris last summer, a committee was appointed to investigate and report on questions of street hygiene, the report to be made at the next session of the Congress. We have received a circular giving the names of the committee. The member from the United States is Mr. Rudolph Hering, 100 William street, New York city. The Honorary Chairman is Mr. F. Andreas Meyer, of Hamburg, and the Chairman is Mr. H. Alfred Höchling, Civil Engineer, of Leicester, England. The General Secretary is Dr. Th. Weyl, Charlottenburg-Berlin, 5 Carmer Strasse. There are 11 other members representing various countries.

Supplies for British Railroads.

H. F. Parshal, an American engineer interested in Charles T. Yerkes' projected underground electric railroad in London, arrived in New York, on Jan. 6, to place orders for supplies for the Central London Ry. and the Glasgow Corporation Tramway.

Tools for the British Westinghouse Works.

Invitations for bids for over \$500,000 worth of machine tools for the British Westinghouse works, at Manchester, England, have been sent to tool makers of the United States, Germany and England by Henry F. Loud, general manager of the British plant, who is at present in Pittsburgh. It is probable that the limited time allowed in which to furnish the tools will require a distribution of the contracts.

Pennsylvania Steel Company.

The Board of Directors of the Pennsylvania Steel Company on Jan. 8 adopted the \$50,000,000 reorganization plan. The stockholders are to deposit their stock in assent to the plan not later than April 1. It is proposed to form a new company having a capital of \$25,000,000 preferred stock and \$25,000,000 common stock, of which \$4,500,000 preferred and \$10,250,000 common will remain in the treasury as a reserve, making the amount of stock outstanding \$20,500,000 preferred and \$14,750,000 common.

A Carnegie Tube Mill at Conneaut Harbor.

According to a press despatch from Pittsburgh Jan. 8 the Carnegie Steel Company has bought 5,000 acres of land at Conneaut Harbor, the Lake Erie terminus of the Pittsburgh, Bessemer & Lake Erie road, on which the company will establish extensive works for the manufacture of pipes and tubes. According to Mr. Schwab, President of the company, on whose authority the information is published, about \$12,000,000 will be invested, exclusive of the cost of the land. The company,

which controls the railroad named, expects to get its coal and coke at very little cost for transportation, as the preponderance of traffic over the road at present is southbound, so that there are constantly large numbers of empty cars moving northward.

New York Central Construction Contracts.

Bids will be opened on Jan. 21 at the office of W. J. Wilgus, Chief Engineer of the New York Central & Hudson River, for certain of the extensive improvements to be made at the terminals in Weehawken, N. J. The work includes rearrangement of the yards, and building a bulkhead about one mile long, also new piers. An illustrated description of the work was given in the *Railroad Gazette*, Sept. 7, 1900, page 590.

Bids will also be opened at the same place and time, for a 60-stall roundhouse to be built at West Albany, N. Y.; also for a coal-storing plant with a capacity of 40,000 tons, and for new turntables, ashpits and a 50-pocket coal trestle, at the same place.

At Buffalo, N. Y., the work of eliminating nine important grade crossings will shortly be begun. The streets are to be depressed and the tracks slightly elevated, at a cost of over \$1,000,000. When this work is finished, the main line of the New York Central through the City of Buffalo will cross all streets either above or below the street level. The Belt Line grade crossings in Buffalo are to be eliminated later.

THE SCRAP HEAP.

Notes.

Passenger trainmen on the Rome, Watertown & Ogdensburg Division of the New York Central have had their pay increased from 9 to 15 per cent.

The New York Central & Hudson River has made an advance of 10 per cent. in the wages of about 1,700 men working in the shops of the company at West Albany.

A fire at Cambridge, Mass., Jan. 5, destroyed 40 freight cars and two hay sheds of the Boston & Maine.

General Manager Ramsey, of the Wabash road, has written a letter to the employees congratulating them on the successful business of the road during the past year and thanking them for their zeal.

At Philadelphia last week a man named T. J. Sprunell was arrested for obtaining a pass from the Philadelphia & Reading by false pretenses, and then trying to get a printer to make 300 copies of it.

A resolution has been introduced in Congress by Senator Harris directing the Interstate Commerce Commission to investigate and find out whether there are now in existence any railroad associations which violate the anti-trust law. Representative Ray, of New York, has introduced a bill making train robbery, resulting in death, a capital offense, and a similar bill has been introduced in the Senate by Mr. Hoar.

The states of Kansas and Nebraska are now practically without railroad commissions. The Kansas Act of Visitation has been killed by a decision of the Supreme Court of the state, and the Nebraska Board of Transportation has been made practically useless in the same way. As a result of the present conditions the politicians in both states are talking of new legislation for the more direct regulation of the railroads; but, according to a correspondent of the New York *Evening Post*, the railroads appear to be unconcerned about what is going on. It is believed that the people will find themselves so well satisfied with their relations to the railroads during the past year or two, when there was no commission regulation, that they will not approve radical action by the legislatures.

Traffic Notes.

The Maine Central announces that its thousand-mile tickets, sold at two cents a mile, will hereafter be good for the bearer.

The railroads in the Central Traffic Association have adopted a revised tariff for parties carried in special cars. Where the party is small a charge of 15 cents a mile is made on the car (minimum \$10 for the first car and \$5 for each additional car), the object being to secure a minimum gross revenue of 55 cents per car mile. For intermediate stops a switching charge of \$5 is to be made. Roads must not pay mileage on baggage or other cars belonging to private parties.

The Water Supply of Troy.

Prof. W. G. Raymond has prepared a comprehensive description of the present and proposed water supply of the city of Troy, N. Y., which is published in the *Troy Daily Times* of Dec. 29. To those interested in this class of engineering the article is well worth getting.

Potomac River Water.

An informal hearing was held at the Waldorf-Astoria Hotel in New York on Jan. 4 by the Senate Committee on the District of Columbia to hear testimony on the relative merits of different systems of water filtration which could be used to purify the Potomac River water used by the city of Washington, which has been seriously contaminated of late. Senator McMillan, Chairman of the committee, presided, and the hearing continued all day. The slow-sand and mechanical systems were both thoroughly discussed by experts invited to testify, and some difference of opinion developed. The Medical Society of the District of Columbia, the Committee on Public Health of the Board of Trade and the Health Officer of the District advocate the slow-sand method of filtration, which Col. Miller, of the Engineer Corps of the Army, who made estimates for Congress of the work of both systems, reported in favor of the mechanical system, under which the building of a mechanical filtration plant has already been begun. Among others who gave testimony were Dr. Billings, Prof. W.

P. Mason, of Rensselaer Polytechnic Institute; Allen Hazen, Edmond B. Weston, George A. Johnson, Rudolph Hering and George W. Fuller. It was decided that before reaching a final conclusion as to which method shall be used for Washington, further data should be obtained, and an expert commission, consisting of Messrs. Hazen, Hering and Fuller, was authorized to make a careful study of the filtration problem in the District, and report to the Committee of the Senate its conclusions as to the best method of filtering Potomac water. It is expected a report will be made in time for action at this session of Congress.

Indiana Law for Signaling at Street Railroad Crossings.

In a suit recently decided at Indianapolis, the Superior Court (Judge McMaster) holds that the law imposing on an electric street railroad the whole of the expense of interlocking signals at a crossing with a steam railroad is unconstitutional. The suit was brought by the Pennsylvania to compel the Indianapolis, Greenwood & Franklin Railway Company to establish interlocking at the crossing of the tracks of the two companies. Judge McMaster sustained the demurrer of the street company. He holds that the act under which the suit was brought imposes on the electrical railroad companies the duty of placing the interlocking device, while it does not obligate the steam railroad companies to do the same thing where their tracks cross those of an electrical road. This conflicts with the provision of the constitution of the State of Indiana that the General Assembly shall not grant to any citizen or class of citizens privileges or immunities that shall not equally belong to all. The act in question is a police regulation, and the danger in one case is precisely the same as in another. And the circumstances and conditions surrounding it are the same. The case will probably be carried to the Supreme Court for a decision.

A Railroad Contract in Nicaragua.

The Nicaraguan Government has contracted with Mr. Julio Weist, an American engineer resident at Managua, to build a railroad terminus of the Oriental Division of the National system at Managua, to pass along the north of Lake Asososca to the village of La Paz, Department of Leon, to connect with the Occidental Division of the same system, in all 37 miles. Two years are allowed for completing the work. The Government agrees to supply materials; also two locomotives and 22 cars for building. When completed, the road will afford uninterrupted transit from Corinto, on the Pacific, to Grenada on Lake Nicaragua.

I. C. C. Decision on Transcontinental Rates.

The Interstate Commerce Commission has decided the case of George J. Kindel and the Denver Chamber of Commerce against the Atchison, Topeka & Santa Fe and others, once more going over the question of the application of the long and short haul law as affecting New York-Denver and New York-San Francisco rates, including the right to meet water competition. The decision calls for some revision of existing rates, and lays down principles governing the making of rates in the face of water competition. The case involved the legality of greater charges to Denver than to San Francisco from Missouri River; greater charges from Denver than from Missouri River to San Francisco; greater charges to Denver than to Missouri River from San Francisco; greater charges from Denver than from San Francisco to Missouri River.

Pending the controversy numerous concessions in rates in favor of Denver were made by the carriers. Water competition fixes the rate between New York and San Francisco. The carriers have recognized the desire of Chicago and Missouri River points to do business on the Pacific Coast, and have given rates in no case higher and in many cases lower than obtains at New York.

The Commission says that if these roads have carried the rate which water competition fixes 1,400 miles from the Atlantic seaboard, they must not stop there. Neither the desire to do business nor the right to do business ceases with the Missouri River. Denver, a thousand miles west of Chicago, may demand the same treatment which its rival cities have received. It is held by the Commission that the rates complained of are in violation of the fourth and third sections of the law; and that, as matter of general application, rates at Denver to or from the East, or to or from the Pacific Coast, ought not to be higher than those between San Francisco or other Pacific Coast terminals and Missouri River or points East. While there are, perhaps, instances in both directions where higher intermediate rates may properly be maintained, no exception has been claimed as to any article west-bound. In the case of east-bound traffic the carriers' contention that the rate on sugar might be higher to Denver than to Missouri River is sustained, it being found that the circumstances and conditions governing the traffic are different when it is carried to Missouri River points than when it stops at Denver.

The Commission also decides that Denver is not entitled by reason of its being nearer to San Francisco to a lower rate than that in force from the Missouri River. The decision is confined to the general situation, but the carriers are recommended to correct the injustices apparently resulting from rates on certain articles mentioned in the testimony, and the Denver Chamber of Commerce or any person interested, is given leave to bring any specific complaint to the attention of the Commission.

It is held that a railroad is not justified in discriminating against a community or an individual by the fact that the person or locality so discriminated against is not directly injured. The law declares that under like circumstances and conditions the individual every commodity and every community shall be treated alike, and the fact that they are not is a violation of law. The denial of a legal right is itself an injury.

Locomotive and Car Shops for Spain.

The *Revista Minera*, Spain's leading engineering paper, states that a powerful syndicate has been formed at Madrid to establish several locomotive and car works in the country. The capital of the syndicate is given as about \$2,400,000, its headquarters being at Madrid.

Business Failures in 1900.

A summary of the year by *Bradstreet's* shows that failures in 1900 were slightly more in number, and the liabilities slightly increased over the preceding year. There were 9,913 failures in the United States last year, against 9,634 the preceding year, while the liabilities were \$127,200,000 against \$119,700,000. The assets were a little over \$60,000,000 for each year. The collapse of the so-called flour trust largely swelled the lia-

bilities column and more than accounts for the entire increase in liabilities over 1899. Early in the year there were some large suspensions in the silk, paper and publishing trades, while late in December were some heavy bank failures, a woolen goods manufacturing collapse and embarrassment in the iron trade.

A statement of the number of failures, with percentages of increase or decrease, from year to year, and totals of assets and liabilities for 20 years (with assets and liabilities given in millions and tenths of millions of dollars), is as follows:

No. failures.	P. ct. inc. or dec.	Actual assets	Total P. c. ass'ts	liabls. to liabls.
1900.....	9,913	+2.8	60.1	127.1
1899.....	9,634	-17.3	60.2	119.7
1898.....	11,638	-11.2	72.9	141.1
1897.....	13,099	-13.3	85.6	156.1
1896.....	15,112	+16.1	148.2	247.0
1895.....	13,013	+2.2	88.1	158.8
1894.....	12,721	-18.3	79.7	149.5
1893.....	15,560	+51.5	262.4	402.4
1892.....	10,270	-17.1	54.7	108.5
1891.....	12,394	+16.2	102.8	193.1
1890.....	10,673	-9.0	92.7	175.0
1889.....	11,719	+10.7	70.5	140.7
1888.....	10,587	+9.7	61.9	120.2
1887.....	9,740	-7.8	64.6	130.6
1886.....	10,368	-4.9	55.8	113.6
1885.....	11,116	-4.7	55.2	119.1
1884.....	11,620	+13.0	134.6	248.7
1883.....	10,290	+34.0	90.8	175.9
1882.....	7,635	+28.0	47.4	93.2
1881.....	5,929	....	35.9	76.0

New Bridges on the Lackawanna Railroad.

Among the larger bridges nearing completion or under way on the Delaware, Lackawanna & Western, are six 160-ft. fixed spans over the Susquehanna River near Binghamton, N. Y., two 200-ft. fixed spans and one 200-ft. draw span over the Hackensack River near Hoboken, N. J.; four 125-ft. fixed spans and one 236-ft. draw span over the Hackensack River at Secaucus, N. J., and one 220-ft. draw span over the Passaic River at Newark, N. J. They will mainly replace light structures. The Edge Moor Bridge Works is supplying the material.

Electrical Equipment of the B. & O. Tunnel.

The equipment of three and one-half miles of Baltimore & Ohio track at the tunnel in Baltimore, with the Murphy safety third-rail device, is said to be about completed and ready for test on Jan. 15. The promoters of this scheme decline yet to give explicit technical information. Alleged interviews in the daily press describe the apparatus as an electro-pneumatic combination.

Rolling Stock Needed in Spain.

In a recent issue of the *Madrid Gazette* a royal order was published calling attention to the great lack of rolling stock on most of the Spanish lines. The order pointed to the inconveniences and losses experienced by industries, and urged the companies to increase their rolling stock. In connection with this we may say that the principal Spanish Railroad Co., the Northern (Madrid, Senor D. J. Barat, General Manager), whose system has a total length of 2,400 miles, had, at the beginning of 1900, 666 locomotives, 1,920 passenger and 12,900 freight cars. His Excellency, Senor D. Praxedes M. Sagasta, the former Prime Minister of Spain, Carrera de San Jeronimo 53, Madrid, is President of the Northern. The second largest railroad in Spain is the Madrid, Saragossa & Alicante, with office at Estacion de Atocha, Madrid. Mr. Nathan Süß is the Director; Mr. J. T. de Cuevas, Locomotive Superintendent, and Mr. E. Chabardes, Car Superintendent. The mileage of the whole system is 2,268, and the rolling stock consists of 528 locomotives, 1,379 passenger, and 10,956 freight cars. The Andalusian Railway Company has offices at 8, Boul. Malesherbes, Paris, France; and at 12, Paseo de los Recoletos, Madrid. Senor Detré, Malaga, is Director General; and Senor G. Goulez, Malaga, Locomotive Superintendent. The company's system is 670 miles in length, and the rolling stock consists of 165 locomotives, 489 passenger and 3,248 freight cars. The Madrid, Cáceres & Portugal has its head offices at Estacion de la Delicias, Madrid, M. E. Paquet being Chief Engineer, and M. P. Normand Locomotive Superintendent. The mileage is 485; the rolling stock consists of 64 engines, 132 passenger and about 1,050 freight cars.

The last year for which official Spanish statistics are available is 1899. During that year the total imports of "railroad material" amounted in value to only about \$840,000. Locomotives were chiefly supplied by Great Britain, France and Germany. Cars were largely imported from Belgium. The gauge of all the above systems is 1.67 meters (5 ft. 6 in.).

Rolling Stock for the Damascus-Mecca (Hedjas) Railroad.

A few weeks ago (Dec. 14, p. 830) attention was called in these columns to the rail contract for the Damascus-Mecca Railroad. Latest news from Constantinople is to the effect that the Turkish Government tried with the same haste to place orders for rolling stock. Bids were asked for three locomotives with tenders, and it is stated that the lowest price, viz., 50,000 francs per engine and tender, was submitted by the representative of an American firm. When the contract was to be signed, difficulties arose: The Turkish Government insisted upon brass tubes, whilst the American firm's price was for iron tubes. During the negotiations following the American firm closed its shops, but the Brooks Works entered upon the same contract in all its details, and declared itself ready to carry on further negotiations with the Turkish Government. Furthermore, prices were asked for three tender-locomotives for construction. The lowest bidders were the Ateliers de la Meuse in Belgium, which secured the contract at the price of 32,500 francs per engine. The German firm of Henschel & Co., of Cassel, submitted a price of 32,250 francs, but were told that the contract with the Belgian firm had already been signed. The Krause Locomotive Works of Munich, Maffei of Munich, and the Winterthur (Switzerland) Locomotive Works asked 36,000, 38,000 and 41,000 francs, respectively. The Ateliers de la Meuse also secured a contract for the supply of 20 ballast cars, 15 tons each, and the total price for them, erected at Beyroot, is 75,000 francs. It is said that the first instalment of 12½ per cent. has already been paid; the same rate has to be paid every month until 50 per cent. is paid. When this 50 per cent. shall have been paid, the engines and cars must be ready for shipment at the works of the contracting firm. An additional payment of 20 per cent. will then be made against bill of lading in Antwerp, and the rest at the arrival and after inspection at Beyroot.

I. C. C. Decision on New York Car Float Rates.

The Interstate Commerce Commission lately in an opinion by Commissioner Yeomans, announced its decision in the case of Warren-Ehret Co. against the New York, New Haven & Hartford Railroad Company and others in favor of the complainant. The case involves the legality

of a rate on roofing slag from Leesport, Pa., to Harlem River station in New York. The rate on this slag in carloads is \$3.40 per ton, of which the carriers to Communipaw, N. J., on the Hudson River, receive \$1.30 per ton, the balance, amounting to \$2.10 per ton, going to the New York, New Haven & Hartford Railroad Company for its services in carrying the slag by its car floats from Communipaw to its Harlem River station. Such through rate also applies as a group rate to numerous stations on the New Haven road in what is known as the Hartford group, including Waterbury, Conn. The freight could be transferred by an independent lighterage company from Communipaw to Harlem for 60 cents a ton, and railroads terminating on the New Jersey shore generally allow 60 cents a ton for lighterage to points within New York lighterage limits. The Commission holds that the through rate of \$3.40 to Harlem River is grossly unreasonable, and is rendered so by the excessive share of \$2.10 to the New Haven road for transfer by its car floats from Communipaw to Harlem River; that reasonable compensation for such delivery by car floats should not exceed \$1 a ton, and this added to the share of \$1.30 received by the connecting carriers constitutes a reasonable and lawful rate of \$2.30 a ton, which the carriers are recommended to put in force; that the complainant is entitled to reparation on a shipment of two carloads of slag to the extent of the difference between the rate charged and the rate found reasonable. The propriety of the \$3.40 rate applied as a group rate to all stations in the Hartford group was not passed upon by the Commission. A further ruling by the Commission in this case is that while a shipper has no direct interest in the way a joint rate is divided between the carriers, nor in the amount of the division received by each carrier, he is entitled to inquire into such division, when he complains that the joint rate is unlawful, for the amount received by the different carriers may be significant upon the reasonableness of the aggregate charge; and when an unlawful rate results from some arbitrary share or division exacted by one of the carriers, the Commission will find the facts and state its conclusions with respect to such share or division.

Technical Schools.

Purdue University.—Mr. H. G. Prout, Editor of the *Railroad Gazette*, delivered, on Dec. 20, an address before the Engineering students of Purdue University on the subject of "The Future of the Engineer in Railroad Service."

The *Rensselaer Polytechnic Institute* has in operation a new electrical laboratory containing 16 machines, generators, and transformers, together with a full equipment for practical tests. The laboratory for the test of materials of engineering is increased by the addition of one 300,000-lb. testing machine and one 100,000-lb. testing machine, and a 10,000-lb. wire testing machine. The two former are operated by an electric motor. There will also be a new cement testing laboratory fully equipped for the most approved modern tests.

Our Exports of Iron and Steel and Locomotives.

The advance sheets of the monthly summary of imports and exports up to the end of November are just received from the Bureau of Statistics, Treasury Department. Figures are given for the month of November and for the 11 months ending November. The quantities below are for these 11 months. Preliminary figures for the year have been issued through the daily press, but we shall await the receipt of the actual official figures before publishing them.

	1898.	1899.	1900.
Pig Iron:			
Tons	217,796	216,609	257,265
Value	\$2,223,975	\$3,037,063	\$4,254,743
Rods:			
Pounds	85,318,692	101,485,352	184,892,778
Value	\$932,727	\$1,454,317	\$3,156,995
Billets, ingots and blooms:			
Tons	21,170	25,407	94,717
Value	\$396,320	\$531,081	\$2,600,443
Rails:			
Tons	276,346	245,620	341,016
Value	\$5,478,972	\$5,430,723	\$10,432,517
Locomotives:			
Number	549	462	398
Value	\$4,922,189	\$4,544,350	\$4,061,887

A New Lake Steamship Line.

Frank H. Peavey, of Minneapolis, Minn., who is interested in the shipment of grain from the Northwest to the seaboard, is reported organizing a company to operate a fleet of grain-carrying vessels on the Great Lakes. A contract has been let for four steamers with a carrying capacity of 6,000 or 7,000 tons. They will be 450 ft. long over all, 430 ft. keel, 50 ft. beam and 28½ ft. molded depth.

Tacoma to Liverpool via Suez Canal.

The British ship "Glenloch" is to load with 221,160 bushels of wheat at Tacoma, and will sail for Liverpool, by way of the Suez Canal, being the first steam vessel to go from Tacoma to Europe over that route with wheat. There is a difference in favor of the Cape Horn route of 1,800 miles, but the price of fuel at the coaling ports in South America is so much higher that it is believed it will be economy to steam the additional 1,800 miles. The "Glenloch" will coal in Japan, and at Port Said, which place it expects to reach in sixty-five days or less.

The Damascus-Mecca Railroad.

Under date of Dec. 6, the Sultan appointed a German engineer, Heinrich Meissner, Director General of the Damascus-Mecca Railroad. Up to a few weeks ago Mr. Meissner occupied a prominent technical position with the great contracting firm of Count Vitis, which concern has built many railroad lines in Turkey in Europe and Asiatic Turkey during the last two decades.

LOCOMOTIVE BUILDING.

The *Kansas City Belt* will buy two heavy freight engines.

The *Michigan Central* is reported in the market for 10 locomotives.

The *Colorado Southern* is reported in the market for 10 locomotives.

The *Great Northern* is preparing specifications for a large number of locomotives.

The *Lexington & Eastern* has ordered one engine from the Baldwin Locomotive Works.

The *Midvale Steel Co.* is having one engine built by the Pittsburgh Locomotive & Car Works.

The *Choctaw, Oklahoma & Gulf* has ordered six passenger and 14 consolidation engines from the Baldwin Locomotive Works.

The *Wheeling & Lake Erie* has ordered five consolidation engines from the Baldwin Locomotive Works, details of which were published in our issue of Nov. 23, 1900.

The *Hocking Valley* order with the Brooks Locomotive Works, referred to last week, calls for five six-wheel simple switch engines and five simple consolidation engines, for July and August delivery. The switch engines will weigh 113,000 lbs., and have 19-in. x 26-in. cylinders; 50-in. driving wheels; Belpaire boilers, with 180 lbs. working steam pressure and 225 tubes 2 in. in diam. and 11 ft. 1½ in. long; fire-boxes, 97 in. long and 33 in. wide; and a tender capacity for 4,000 gals. of water. The consolidation engines will weigh 140,000 lbs., with 125,000 lbs. on the driving wheels and have 20-in. x 26-in. cylinders; 54-in. driving wheels; Belpaire boilers, with 180 lbs. steam pressure, and 240 tubes 2 in. in diam. and 13 ft. 10 in. long; fire-boxes, 108 in. long and 41 in. wide; and a tender capacity for 5,000 gals. of water. The special equipment for all includes "Diamond S" brake-shoes, Buckeye couplers, Ohio injectors, Coale safety valve, Leach sanding devices, Michigan lubricators, French springs and Latrobe tires on the driving wheels.

CAR BUILDING.

The *Pullman Co.* is building 12 cars for its general service.

The *American Car & Foundry Co.* has orders for 600 cars for export.

The *Lehigh Valley* has issued specifications for 24 cars for passenger service.

The *New York Central & Hudson River* is having three cars built by the Pullman Co.

The *Erie* has ordered the 100 refrigerator cars referred to Dec. 21 from the Erie Car Works.

The *Rio Grande Western* is having two cars for passenger service built by the Pullman Co.

The *Atchison, Topeka & Santa Fe* has ordered 500 box cars from the Mt. Vernon Car Mfg. Co.

The *People's Gas Light & Coke Co.* has ordered eight tank cars from the Illinois Car & Equipment Co.

The *Wheeling & Lake Erie*, it is reported, has ordered 250 cars from the American Car & Foundry Co.

The *Central Chemical Co.* has ordered 10 cars from the American Car & Foundry Co., to be built at the Milton shops.

The *Barrett Mfg. Co.* has ordered 20 cars from the American Car & Foundry Co. They will be built at Milton.

The *Durr Construction Co.*, of Bethlehem, Pa., has ordered 63 standard ballast cars from the Rodger Ballast Car Co.

The *Atchison, Topeka & Santa Fe* has ordered 500 box cars, with steel center sills, from the Illinois Car & Equipment Co.

The *Wallace Circus Co.* has ordered one 60-ft. stock car and three 60-ft. flat cars from the Illinois Car & Equipment Co.

The *Gulf & Ship Island* order, recently placed with the Rodger Ballast Car Co. for 20 standard ballast cars, has been increased to 40.

The *Toledo & Ohio Central* has ordered 1,100 coal cars from the American Car & Foundry Co. The specifications include Simplex bolsters.

The *Chicago, Rock Island & Pacific* is in the market for 500 box cars and has ordered 100 furniture cars from the Illinois Car & Equipment Co.

The *Choctaw, Oklahoma & Gulf* has ordered 350 freight cars from the Southern Car & Foundry Co., 400 from the Mt. Vernon Car Mfg. Co., and 100 from the Georgia Car & Mfg. Co. Simplex bolsters will be used on all of these.

The *Hocking Valley* order with the Pullman Co., referred to last week, calls for 1,500 coal cars of 80,000 lbs. capacity, for June, July and August delivery. The cars will weigh 33,000 lbs. and be 36 ft. long and 9 ft. 8½ in. wide, with sides 3 ft. 7 in. high. They will be equipped with Simplex bolsters, U. S. Bronze Co.'s brasses, Hoey draft riggings, McCord journal boxes, and Scott springs.

BRIDGE BUILDING.

ALBUQUERQUE, N. MEX.—Plans are being considered by the City Council for the proposed viaduct over the Atchison, Topeka & Santa Fe tracks. It will be about 1,030 ft. long.

ATLANTIC CITY, N. J.—The County Board of Freeholders has let a contract for the steel work for the bridge at Albany avenue to the American Bridge Co., at \$10,500.

BELOIT, WIS.—Two steel bridges will be built by the city, one over Rock River, and the other over Turtle Creek. L. E. Cunningham, Chairman of the Bridge Committee.

BENWOOD, W. VA.—The Secretary of War has authorized the Baltimore & Ohio to rebuild four of the existing spans of its bridge over the Ohio River between Benwood and Bellaire, Ohio. The two channel spans will remain as at present, but may later be changed into one span.

BILLINGS, MONT.—We are informed that a contract has been let to Wm. S. Hewett, of Minneapolis, Minn., for a 480-ft. steel wagon bridge over the Yellowstone River at East Billings, at \$11,500. The county can spend only \$10,000 on any one bridge without the proposition being submitted to a vote. If \$1,500 cannot be added by popular subscription, the contract will be dropped. The bridge is a combination, three 160-ft. spans, on two steel cylinder piers.

BONAVENTURE, QUE.—We are told that a contract is let to the Hamilton Bridge Co. for a steel bridge, 315 ft. long, over Bonaventure River, for the Atlantic & Lake Superior Ry., at \$25,000.

BROKENBOW, NEB.—Bids will be received until noon of Jan. 16, at the office of J. B. Osborn, County Clerk, Custer County, for all the bridge work for the year 1901.

CENTRAL FALLS, R. I.—The bridge which spans the Blackstone River at Mill street, a continuation of North Main street, Pawtucket, has been reported by City Engineer Keene, of this city, as unsafe.

CINCINNATI, OHIO.—Bids will be opened, Jan. 16, at 12 o'clock noon, by the Board of Public Service for the

following bridge work: Rebuilding and repairs to superstructure and approaches of the Liberty street viaduct, estimated to cost \$32,500. Also for a 200-ft. extension of the superstructure and work on west approach to the Eighth street viaduct, which will consist of two plate girder spans of 70 ft. each, and one plate girder span of 60 ft. The roadway will be 36 ft. wide, to be paved with asphalt; two sidewalks, 6 ft. each, paved with cement. The total work to cost \$32,997. Plans and specifications are on file in the office of H. J. Stanley, Chief Engineer. Robert Allison, President.

DES MOINES, IOWA.—A viaduct is proposed at Seventh, Eighth or Ninth streets. A committee is considering a site.

FREDERICTON, N. B.—We are informed that bids will be received, on Jan. 17, by the Hon. C. N. La Billois, Chief Commissioner, Department of Public Works, Fredericton, N. B., for four steel bridges, as follows: St. Louis bridge over the St. Louis River, Kent County, to be one span of 150 ft.; Upper Corner bridge, Sussex, Kings County, to be three spans of 63 ft. each; Taylor's Mill bridge, Rothesay, Kings County, to be one span of 63 ft.; and the Tobique Narrows bridge, over Tobique River, Victoria County, to have one span of 200 ft., and one span of 80 ft. A. R. Wetmore, Prov. Engineer.

GRAND RAPIDS, MICH.—A contract has been let by the Pere Marquette for its new steel bridge over Grand River at this place. It will be 506 ft. long and will be built by the Detroit Bridge & Iron Works. The railroad company's forces will build the foundations. (Oct. 26, 1900, p. 710.)

HOMESTEAD, PA.—The bridge which the American Bridge Co. will build for the Pittsburgh & Lake Erie R. R. over the Monongahela River, will have three deck spans about 150 ft. each, one through span of 145 ft., one through span of 200 ft., and another through span of 350 ft., and a viaduct approach of 500 ft. It is to be a double track structure, and is estimated to cost \$180,000.

ILLIOPOLIS, ILL.—The Supervisors of Christian County have decided to build a bridge over the Sangamon River at or near Illiopolis or Niantic, Christian County.

JACKSON, MICH.—Bids will be received, on Jan. 30, by Wm. G. Fargo, Engineer for the American Railway Constructing Co., Ltd., for a steel bridge 60 ft. long, with steel trestle approach to make the total length 400 ft., to be built at Panna Village, over the tracks of the Michigan Central R. R. Bids were received on Jan. 10, for three steel girder spans of about 175 ft., for a viaduct in Michigan Center Village for this company. Both viaducts are proposed to carry 35-ton electric railroad cars.

LURAY, VA.—The Norfolk & Western, according to report, will build an iron bridge over the Hawksbill Creek.

MARIETTA, GA.—The American Bridge Co. has a contract with the Atlantic, Knoxville & Northern for five steel bridges, as follows: McGhee, Tenn., over Little Tennessee River, a structure 550 ft. long, at \$35,000; Reliance, Tenn., over Hiwassee River, 450 ft., \$32,000; Canton, Ga., over Etowah River, 260 ft., \$15,000; Cambria, Tenn., over Cambria Creek, 75 ft., \$4,000; Farner, Tenn., over Turtle Creek, 55 ft., \$5,500. The railroad company will build the foundations.

NEWARK, N. J.—Mayor Seymour, of Newark, has signed the ordinance for the elevation of the tracks of the Central and Pennsylvania railroads in Newark, which involves an expense of \$600,000 to the city.

NEWPORT, N. H.—The Selectmen have voted to build a new bridge at Kellyville, to replace the present wooden bridge.

NEW WESTMINSTER, B. C.—The Victoria & Eastern Railway will build a steel bridge over the Fraser River at a cost of about \$600,000.

NORTH ESCANABA, MICH.—The Chicago branch of the American Bridge Co. has the contracts for three of the steel bridges for the Minneapolis, St. Paul & Sault Ste. Marie, which were recorded in the Bridge Building Department of our last Supplement (page 556). They are, a steel structure 500 ft. long over Escanaba River, located half a mile east of North Escanaba, at \$40,000; another is a 150-ft. steel structure to cross Ford River, one-half mile west of Newhall, Mich., at \$11,500; another is a 70-ft. structure to cross Ten-Mile Creek about 1½ miles west of Newhall, at \$5,000. The Escanaba bridge will consist of five 100-ft. lattice girders; the Ford River bridge, two 45-ft., and one 60-ft. deck plate girders; the Ten-Mile Creek bridge a 70-ft. plate girder. All are to be on concrete piers and abutments. The superstructures are to be built next spring. The live loads used are two 177½-ton engines and a trainload of 5,000 lbs. per ft.

OAKLAND, CAL.—The following bids were received, with plans, for a concrete culvert over San Leandro Creek, and were opened by the Clerk of the Board of Supervisors on Dec. 24: Cotton Bros., \$32,000; W. F. Boardman, \$24,800; J. W. Miller, \$12,242; J. B. McMath, \$17,000; F. D. Elwell, \$25,000; J. G. McMillan, \$25,150; G. L. Nusbaumer, \$31,150. No award was made.

OMAHA, NEB.—We are informed that the viaduct proposed over the tracks of the Burlington & Missouri River and the Union Pacific, on 24th street, will be built directly by these roads. It will be a steel structure 1,022 ft. long, and cost about \$100,000. It is to have 35 ft. roadway with double track street railroad in center, and 10-ft. sidewalks.

PARKERSBURG, W. VA.—The Baltimore & Ohio bridge over the Ohio River at Parkersburg may be rebuilt. The United States Engineer, at Cincinnati, Ohio, in charge of the Ohio River District, will report to the Secretary of War on the necessity of larger spans.

PESHTIGO, WIS.—We are told that the Town Board of Peshtigo wants information relative to building a steel bridge, about 192 ft. long, over Peshtigo River. William Ellis, Jr., Chairman of Town Board. (Jan. 4, p. 14.)

PHILADELPHIA, PA.—The Council has passed an ordinance authorizing Wm. Sellers & Co. to build a bridge across Hamilton street west of 16th.

PITTSBURGH, PA.—In his annual report, George W. Wilson, Director of the Department of Public Works, asks \$125,000 for bridges at Lincoln avenue, Mission street, and Pius street.

RICHMOND, VA.—The Chesapeake & Ohio has let contracts to the Pencoyd Iron Works for four steel bridges, as follows: Near Joshua Falls, Va., over First James River, 771 ft., at \$43,412; near Snowden, Va., over Second James River, 714 ft., at \$34,730; near Longdale, Va., over Cow Pasture River, 298 ft. 4 in., at \$18,516.50; near Lowell, W. Va., over Third Greenbrier River, 560 ft., at \$61,250. The bridges will all be on old masonry except at Third Greenbrier, where four piers will be built, making eight piers in all.

RUMFORD FALLS, ME.—The town is considering the advisability of building a steel bridge across the canal on Hartford street.

SANTIAGO, CUBA.—Bids will be received by the Engineer Office, Santiago, Cuba, until Jan. 26, for three steel highway bridges. Address S. D. Rothenbach, First Lieutenant, Tenth U. S. Cavalry, Santiago.

SOUTH OMAHA, NEB.—Plans, according to report, are made for a viaduct at O street.

SYDNEY, N. S. W.—The Union Bridge Co. (American Bridge Co.) of New York is reported to be the lowest bidder for the large steel bridge across Sydney Harbor. The estimates varied from £634,625 to £2,927,236. The contract will probably not be let for some time as there are many plans and bids.

TAYLORVILLE, ILL.—The Indiana Bridge Co., of Indianapolis, was awarded the contract, early in December, for the seven bridges for the Highway Commissioners of May Township, Christian County, mentioned in this column last August.

TOLEDO, OHIO.—The Ann Arbor R. R. will build three bridges, one at Clare and two at Sherman, but is only receiving bids from bridge companies adjacent.

WACO, TEXAS.—Bids, with plans and specifications, are wanted, Feb. 4, at the City Hall, for a highway bridge 562 ft. long over Brazos River. It is undecided whether the Melan Arch type or the steel truss will be adopted. Estimated cost, \$100,000. Either G. B. Gerald, County Judge, or J. W. Riggins, Mayor of Waco, will receive the bids. G. B. Guiley, City Engineer.

WILLIAMSTOWN, MO.—We are told that bids will be received, on Jan. 28, by Geo. H. Roberts, County Surveyor, for an iron bridge over North Fabius River, three miles south of this place. The contract will be let at Monticello, the county seat.

Other Structures.

ABERDEEN, WASH.—An officer of the Northern Pacific is reported as saying that the company will spend about \$25,000 on improvements, which include removal of and an extension to the depot. A warehouse will be built and some of the tracks changed.

BOSTON, MASS.—Application has been made to the Railroad Commissioners of Massachusetts by the Boston & Albany, for permission to issue bonds to the amount of \$2,500,000, for improving the terminal facilities in East Boston, and on the Grand Junction R. R. from its connection with the main line to the wharves and warehouses at East Boston.

BRISTOL, TENN.—The car shops of the Virginia & Southwestern, at Bristol, were burned on Jan. 5.

BROOKLYN, N. Y.—The Brooklyn Rapid Transit Co. is making arrangements to build an addition to its electric power plant in South Brooklyn. The Westinghouse Electric Co. is reported to have the contract for the electrical equipment. There will also be an increase of one-third in the capacity of the Kent avenue power house in the Williamsburg district.

BUFFALO, N. Y.—Contracts for the first blast furnaces, seven in number, according to report, for the new steel plant at Stony Point, have been let to Lathrop, Shay & Henwood, contractors for the Buffalo & Stony Point R. R. Work is to be begun at once and be finished next August.

CHICAGO, ILL.—The plant of the Bellaire Stamping Co., at Harvey, Ill., was destroyed by fire on the morning of Dec. 31, causing a loss of about \$400,000.

The City Street Ry. Co. contemplates building a large car house at 77th street and Wentworth avenue, also an electric power plant at Halstead street and 38th street.

DULUTH, MINN.—Plans have been made by the Duluth & Iron Range for five new iron ore docks and other improvements at Burlington Bay, Minn., which are to cost about \$3,000,000. The Government is asked to appropriate about \$400,000 for a breakwater across the entrance on Burlington Bay.

ELIZABETHPORT, N. J.—The Central R. R. of New Jersey is doing the preliminary work preparatory to building the proposed car repair shops at Elizabethport. At various times during the past 10 years it was reported that this work was to be begun.

GLENWOOD, PA.—An officer of the Baltimore & Ohio is reported as saying that the shops at Glenwood will be enlarged and that plans for new buildings are being made.

HOUGHTON, MICH.—The Copper Range Railroad will build a coal dock at this place, with elevated trestle and continuous pocket with tracks on the dock underneath the pocket for loading engines and cars. Alongside of the trestle there will be a coal stock pile with an average capacity of 70 tons per lineal foot. The coal will be handled with traveling steel cantilever tower, which runs on an elevated trestle above the pocket. This tower will handle coal between boats, pocket and stock pile. The company also proposes to build a traveling derrick on the present crib dock to handle freight between boats, cars and freight house platform. Several new sidings will be put in the yard, and the present ones extended.

PENCOYD, PA.—Work on the foundations for the two new shops for the Pencoyd Iron Works of the American Bridge Co., at Wissahickon, is under way, and it is proposed to have the buildings erected in the spring. A foundry and machine shop, each 100 x 340 ft., will be built.

PORTLAND, ME.—General Manager Geo. B. Reeves, of the Grand Trunk, is reported as saying that a new depot, new docks and grain elevator will be built in Portland, Me.

TOPEKA, KAN.—The Atchison, Topeka & Santa Fe has been breaking ground for, and will build, buildings to cost about \$480,000, as follows:

Boiler and machine shop, 700 x 150	\$200,000
Blacksmith shop, 400 x 150	75,000
Tender shop, 75 x 250	50,000
Power house and gas plant, 30 x 120	100,000
Freight car truck shop, 50 x 75	10,000
Freight car iron machine shop, 50 x 60	15,000
Pattern shop, 75 x 40	7,500
Frog shop, 75 x 40	10,000
Office building, 40 x 60	7,500
Yard improvements	5,000

The city of Topeka gave the land at a cost of \$100,000.

WASHINGTON, D. C.—Bids were opened at the Department of Justice, in Washington, on Jan. 3, for a new building for that department, under an act passed by Congress about two years ago. Only six bids were received, ranging from \$1,387,000 up to \$1,597,922, the bids specifying different kinds of marble. As only \$1,000,000 was appropriated for the building the matter will have to be again submitted to Congress to make further appropriation. Bids were asked about a year ago, and all of the eight proposals then made were about \$500,000 over

the amount provided. Since that time much dissatisfaction with the site proposed has developed, and an effort will now be made to provide for a larger site elsewhere and a better building.

YOUNGSTOWN, OHIO.—The Youngstown Iron & Steel Roofing Co. has decided to build a sheet mill and galvanizing plant in the suburbs of Youngstown.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

Engineers of Cornell.

The Association of Civil Engineers of Cornell University held a regular meeting on Friday, Jan. 11, in the association rooms, Lincoln Hall, Cornell University.

New England Railroad Club.

The regular monthly meeting of the club was held at Pierce Hall, Copley Square, Boston, on Tuesday of this week. Mr. H. B. Hodges, Purchasing Agent and Superintendent of Tests of the Long Island Railroad, addressed the club on the subject, "The Value of a Department of Tests for a Railroad Company."

Western Railway Club.

A meeting of the Western Railway Club will be held at the Auditorium Hotel, Chicago, Tuesday afternoon, Jan. 15. Mr. G. L. Gillon, of the Watson-Stillman Co., will present a paper on "Hydraulic Tools," and Mr. D. R. McBain, Michigan Central, and Mr. M. E. Wells, Burlington & Missouri River, will each have papers on "Hot Driving Boxes on Locomotives."

Superintendents of Bridges and Buildings.

The following committee appointments in the Association of Superintendents of Bridges and Buildings are announced:

1. Methods of sinking foundations for bridge piers in depth of water 20 ft. and under. G. W. Andrews, B. & O. R. R., Baltimore, Md., Chairman.
2. Passenger platforms at way stations, best material and cost. J. B. Sheldon, N. Y. N. H. & H. R. R., Woonsocket, R. I., Chairman.
3. Slips for ferryboats used for transferring cars. John D. Isaacs, Southern Pac. Ry., San Francisco, Cal., Chairman.
4. Best method of operating turn-tables by power. F. E. Schall, L. V. R. R., South Bethlehem, Pa., Chairman.
5. Auxiliary coaling stations; best design, capacity and method of handling coal. W. A. McGonagle, D. & I. R. Co., Two Harbors, Minn., Chairman.
6. Water stations; best material for foundations, tanks, substructure, connections, capacity, etc. A. S. Markley, C. & E. I. Ry., Danville, Ill., Chairman.
7. Is it best for railroad companies to erect their own steel structures, or let the manufacturers erect them? O. J. Travis, Ill. Cent. R. R., Chicago, Ill., Chairman.
8. The best and most convenient outfit cars for bridge gangs, and number of men constituting a bridge gang. A. W. Merriek, C. & N. W. Ry., Huron, S. D., Chairman.

Central Railway Club.

A regular meeting of the club (the annual meeting for the election of officers, etc.) was held at the Hotel Iroquois, Buffalo, N. Y., on Friday, Jan. 11, 1901, at 10 a. m.

The discussion of the report of the Committee on Efficiency in the present air-brake system was continued.

The following subjects and committees to report thereon have been appointed:

"What results are being developed in the old class of freight car equipment by the introduction of the heavy type locomotives and the large number of 60,000, 80,000 and 100,000 pounds capacity freight cars that are being placed in service." Committee: Samuel King, M. C. B., Intercolonial Railway, Moncton, N. B.; R. S. Miller, G. E. Car Dept. N. Y. C. & St. L. R. R., Chicago, Ill.; E. G. Rouse, F. C. R., L. V. R. R., Packerton, Pa.

"Comparison in facilities and methods required in engine houses for the daily maintenance of the modern heavy type engines with their numerous special attachments, with the practices ordinarily followed on the lighter type of engines and the less exacting conditions of service." Committee: E. A. Miller, M. M., N. Y. C. & St. L. R. R., Conneaut, Ohio; J. Hawthorne, M. M., Lehigh Valley R. R., Sayre, Pa.; J. W. Sheldon, R. F. E., Pennsylvania R. R., Renovo, Pa.

Pursuant to the decision of the club upon the recommendation of the Executive Committee, at the November meeting, a new departure will be made in establishing the Question Box as a regular feature of the future meetings of the club.

American Society of Civil Engineers.

The forty-eighth annual meeting will be called to order Wednesday, Jan. 16, at 10 a. m., in the auditorium of the house of the Society, 220 West Fifty-seventh street. The annual reports will be read, officers for the ensuing year elected, members of the Nominating Committee appointed, amendment to the constitution considered and general business transacted. Lunch will be served at 1 p. m., after which, if necessary, the meeting will be resumed. As soon as possible after lunch there will be a meeting of the Board of Direction.

As it is probable that there will be considerable time at the disposal of members this afternoon, the committee has arranged for a visit to the Rapid Transit construction work now in progress, of which Wm. Barclay Parsons, M. Am. Soc. C. E., is Chief Engineer, and S. L. F. Deyo, M. Am. Soc. C. E., Engineer for the General Contractor, Mr. J. B. McDonald. The following members of the Society connected with the work have consented to be present, and to conduct parties, as follows:

1. To the South—Albert Carr, Division Engineer; Francis D. Fisher, Engineer for Sub-Contractor; Henry B. Seaman, Engineer for Sub-Contractor; Ira A. Shaler, Engineer and Contractor.

2. To the North—Alfred Craven and B. R. Value, Division Engineers.

Calvin W. Hendrick, M. Am. Soc. C. E., Division Engineer in charge of Sewers, will be glad to take members who are specially interested in sewer work on a visit of inspection to the points of greatest interest which are not on the line of the tunnel.

At 9 p. m. there will be a reception at the house of the Society for members, the ladies of their families and such other guests as they may invite. Dancing may be expected at 10 o'clock, and supper will be served during the evening.

Thursday, Jan. 17, 1901, will be devoted to an excursion by steamer. The steamer "Valley Girl" will leave the foot of West Fifty-seventh street, North River, for

the purpose of visiting points where engineering work of interest is at present in progress. During the day luncheon will be served on the boat. It is expected that a stop will be made at some point on the East River for the inspection of work of the Department of Docks and Ferries, J. A. Bense, M. Am. Soc. C. E., Engineer-in-Chief.

By invitation of Mr. Thomas E. Murray, General Manager of the New York Gas and Electric Light, Heat and Power Company; J. W. Leib, Jr., M. Am. Soc. C. E., General Manager, the Edison Electric Illuminating Company, and Mr. John Van Vleck, Constructing Engineer of both companies, the party will visit the Water-side Power Station at Thirty-eighth street, East River.

A stop will also be made, by invitation of George H. Pegram, M. Am. Soc. C. E., Chief Engineer, at the new power station of the Manhattan Railway Company at Seventy-fourth street, East River.

The following statement of the present condition of the work on the new East River bridge has been furnished by O. F. Nichols, M. Am. Soc. C. E., Principal Assistant Engineer:

The tower foundations were completed about two years ago. They have all been carried to bed rock; on the Manhattan side to about 60 ft. below high water and on the Brooklyn side the extreme depth reached was on the northwest corner of the north tower foundation at 115 ft. below high water. The anchorages are completed so far as they can be until the cables are made. The contract for the steel towers and end spans was awarded in February, 1898, and called for the manufacture and erection of 12,000 tons of steel, about equally divided between the towers and the end spans. The towers are now finished and the saddles set ready for the making of the cables. These saddles weigh about 35 tons each, and each rests on about 40 rollers, 5 in. in diameter and 9 ft. long, rolling on bed-plates of rolled steel weighing about 22 tons each. The anchorages contain about 1,600 tons of steel each, in the shape of anchor bars for the cables and platform girders for the anchorage of these bars. The contract for the building of the cables has been let, and the construction of the foot-bridges is expected to be begun soon. There will be four foot-bridges, one under each of the cables of the bridge, forming a continuous platform from which the men can work for the adjustment of the cable wires. The span is 1,600 ft. from center to center of the towers. The end spans from the tower to anchorage are about 600 ft. each. The width of the bridge is 118 ft. over all, and it will carry two elevated and four trolley railway tracks between the deep stiffening trusses, with a foot-walk and bicycle path over the trolley tracks, and carriage-ways on the cantilever floor beams extending outside of the main trusses. It is expected that the cables will be well advanced, if not finished, during 1901, and that the approaches, which involve the manufacture and erection of 17,000 tons of steel, will be finished during 1902. The contract for the suspended structure of the main span will probably be let during 1901, and will call for about 8,000 tons of steel.

At 8:30 p. m., Thursday, at the Society House, Elwood Mead, M. Am. Soc. C. E., Expert in Charge, Irrigation Investigations, U. S. Department of Agriculture, will describe irrigation methods in use in the arid regions, showing lantern slides of unirrigated and irrigated lands in that region, some of the canals and headgates of irrigation systems, the apparatus used in the Department in the investigations of the duty of water, and the results of these studies. After the meeting there will be a "smoker."

The Arlington Copper Company, through J. H. Granbery, Jun. Am. Soc. C. E., Engineer in Charge of Construction, has extended an invitation to members to visit its mines and plant at Arlington, N. J. Arlington may be reached in 30 minutes from the foot of Chambers street, via the New York & Greenwood Lake Branch of the Erie Railroad, thence by trolley one mile to the works. A trip through the mines and works will occupy about two hours. Should there be a number of members who care to make this trip it would be best to arrange to go in a body, and it is requested that such members notify the Secretary at as early a date as possible in order that suitable arrangements may be made for their reception.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. F. P. Brothers, a well-known railroad contractor, died at Ciego de Avila, Cuba, Dec. 28, after a brief illness. Mr. Brothers was born in Quebec about 60 years ago. He went to Cuba in October to superintend the construction of the Cuba Company's railroad.

—Mr. James Shreve Doran, Superintending and Constructing Engineer of the International Navigation Co., died at his home in Philadelphia, on Dec. 17. In 1873 he became Assistant Superintendent of the American Line of Steamships, and in 1883, on the death of Wm. Marshall, became Superintending and Constructing Engineer.

—Mr. Everett Frazar, Consul General for the Kingdom of Corea in the United States, and well known for many years in the Chinese-Japanese trade, died last week at his home at Orange, N. J. He was born in Massachusetts in 1834. He was President of the American Asiatic Association, Director of the Harvey Steel Company, and had many important business and social relations.

—Mr. H. C. Boughton, Superintendent of the Greenbrier Division of the Chesapeake & Ohio at Roncove, W. Va., was born at Victor, N. Y., June 25, 1844. He entered railroad service in September, 1865, with the New York Central & Hudson River as baggage master and check clerk. He served with the Wabash from November, 1870, as switchman until November, 1879; General Yardmaster until Aug. 10, 1880; Assistant Trainmaster until Sept. 10, 1882, and as Trainmaster until Feb. 1, 1890. He entered the service of the Chesapeake & Ohio on Sept. 15 of the same year, and has since been with that company continuously.

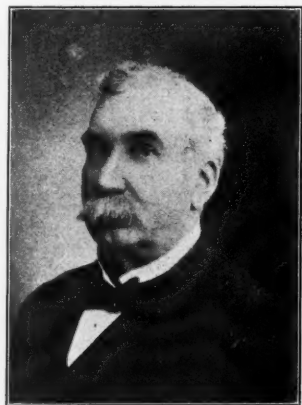
—Wm. M. Corbett, Division Superintendent of the Chicago & Alton at Springfield, Ill., was born Jan. 6, 1858. He began railroad work as a section hand on the Atlantic & Great Western (now part of the Erie) in 1873. He continued with the company as telegraph operator until 1875, when he became station agent of the Buffalo & Jamestown, which was later absorbed into the Erie. Mr. Corbett has continued with the Erie since that time. He served as Train Despatcher until 1887; as Chief Clerk in the Transportation Department, and in the General Manager's office until 1890, and then as Trainmaster of the Delaware Division to Jan. 1, this year, when he made his change to the Chicago & Alton.

—Mr. J. H. Carlisle, Superintendent of the Hunting-ton Division of the Chesapeake & Ohio, has been connected with that company since 1884. Mr. Carlisle was born at Lexington, Ill., in 1860, and entered railroad service in 1877 as messenger and clerk of the Chicago, Alton & St. Louis. He served as clerk, operator and train despatcher for the Toledo, Peoria & Warsaw, the Louisville, Evansville & St. Louis, the Peoria & Pekin Union and the Wabash, until he entered service with the Chesapeake & Ohio. He served as Train Despatcher until 1889, as Chief Train Despatcher until 1891, as Trainmaster until 1893, as Assistant Superintendent until 1896, and as Superintendent of the Mountain and Allegheny districts until his change this month.

—Mr. Robert Trimble, Principal Assistant Engineer, Pennsylvania Lines West, etc., was born at Butler, Pa., Dec. 22, 1856, and removed to West Manchester, Pa., now a part of Allegheny City, Pa., in the fall of 1860. He was educated in the Allegheny Public Schools, and at Western University of Pennsylvania, in Pittsburgh. He entered the service of the Pennsylvania Company in July, 1875, in the Chief Engineer's office as chairman. From July, 1875, to March, 1880, he occupied various positions of chairman, rodman, draughtsman and instrumentman; March, 1880, to July, 1889, Assistant Engineer; July, 1889, to December 31, 1900, Principal Assistant Engineer, Pennsylvania Company; Jan. 1, 1901, Principal Assistant Engineer of the Lines West of Pittsburgh, operated by the Pennsylvania Company and the P., C. & St. L. Ry. Company. His railroad service has been consecutive with the Pennsylvania Lines.

—Mr. John Clark Sims, Secretary of the Pennsylvania Railroad Company, died Jan. 6 at the University Hospital, Philadelphia, where he had been under treatment since Dec. 11. He underwent an operation for appendicitis, and his condition was found to be very serious at the time of the operation. Latterly, however, his recovery had been confidently expected, but he developed a weakness of the heart and a slight pleurisy, and these were the immediate cause of his death. Mr. Sims was born in Philadelphia on the twelfth day of September, 1845. His parents were John Clark and Emeline Marion Sims. In due time he entered the University of Pennsylvania, and was graduated from the Department of Arts in June, 1865. Upon leaving the University he registered as a law student with Hon. Peter McCall. In October, 1868, he was admitted to practice at the Bar of Philadelphia. Shortly after he went abroad, and devoted two years to travel. On Jan. 1, 1876, he entered the service of the Pennsylvania Railroad Company as Assistant Secretary, which position he held until March 23, 1881, when he was promoted to the Secretaryship upon the resignation of Mr. Joseph Lesley. In April, 1881, he was elected Secretary of the Junction Railroad Company; on March 21, 1888, Secretary of the Philadelphia, Wilmington & Baltimore Railroad Company and of the Philadelphia & Baltimore Central Railroad Company, and on June 1, 1898, was appointed Superintendent of the Pennsylvania Railroad Employees' Saving Fund. His position placed him in the closest confidential relations with the officers and boards of directors in all their deliberations, and his responsibilities were therefore of the gravest character. Mr. Sims was peculiarly qualified for his office, possessed as he was of affable and gracious manners, rare discrimination and excellent memory. He was an indefatigable worker, a dignified and capable officer, and a loyal friend. He was a man of wide and refined literary taste, and a lover and patron of music and of out-door sports. The Pennsylvania Railroad Athletic Association, which is now merged into the Pennsylvania Railroad Department, Young Men's Christian Association, owed much to his energy and love of sport. For a number of years he was President and Director of the Athletic Association of the University of Pennsylvania, and the representative of the Board of Trustees upon its University Athletic Committee. He was a member of the Society of the Cincinnati in the State of New Jersey, and a member of the Pennsylvania Society, Sons of the Revolution, and of the Society of Colonial Wars. He was Accounting Warden of St. Paul's Episcopal Church, at Chestnut Hill; President of the Chestnut Hill Academy, Trustee of the University of Pennsylvania, member of the Board of Managers of the University Hospital, the University Veterinary Hospital and the Girard Trust Company.

—Mr. John F. Miller, the General Superintendent of the Pennsylvania Lines, Southwest System, who has retired under limitation of age established by the new pension plan, was born at Ithaca, N. Y., July 16, 1830. He entered railroad service in 1851 as a freight brakeman on the old Cleveland & Bellefontaine Railroad, and subsequently the employ of the Chicago & Great Eastern, which later became a portion of the Pennsylvania System. He was appointed freight conductor in 1852, passenger conductor in 1855, train despatcher in 1859, trainmaster in 1862, Superintendent of the Richmond Division of the Pennsylvania System in 1864, and



General Superintendent of the Panhandle System in 1885. Mr. Miller is one of the old school of rough-and-ready railroad men, who gained his early advancement by being always promptly on the ground in an emergency, perceiving at once what was to be done, and doing it. The force of his personality gave him great influence over his employees that was always exerted for the loyal support of the company. The crowning achievement, perhaps, of Mr. Miller's career was his work in rebuilding the 11 miles of track of the Pennsylvania Railroad that were completely washed away by the Johnstown flood. The officers of the Pennsylvania Lines West of Pittsburgh were accustomed to wash-outs and emergency work, and this devastated tract being on the western slope of the mountains, its repair naturally fell to the officers of the Lines West of Pittsburgh, who were in a position to reach the ground more promptly than their colleagues from the East. The amazing rapidity with which the Pennsylvania Railroad was restored after that flood is a matter of history, and it is also a matter of history that Mr. Miller's personal energy and direction were pre-eminent in the restora-

tion. It is told of him that when he initiated the steps toward replacing a portion of the track so absolutely annihilated even the line of the right-of-way was obliterated, one of the engineers wished the work deferred until the bounds of the right-of-way could be ascertained from Philadelphia. Mr. Miller replied: "Oh, let's get the track built first," and he built it.

During the strike of 1894 at Chicago Mr. Miller's influence with his men contributed in large degree to quelling disorder and the resumption of traffic, and his personal effort is credited with aborting an incipient strike at Cincinnati immediately afterward. No small part of Mr. Miller's influence with his men has been due to his fine tact and to the real kindness of his nature. These qualities, too, have made him widely known and liked and respected by the citizens along the lines of his railroad where he has been the best claim agent the company could have employed. Every farmer and trader knows and respects John Miller. He is a good whip, and has said that the way to get the best results out of men is like getting speed out of horses; that is, they must be given the rein when in action, and be made to feel responsibility; they must be directed but their individuality not stifled. This principle is one of the elements of his success during his long career as a railroad officer. Mr. Miller's active service is evidently not over as he has just become Vice-President of the Cleveland, Akron & Columbus, a subordinate line of the Pennsylvania Company.

—Mr. Leonore Fresnel Loree, now Fourth Vice-President of the Pennsylvania Lines, was born in Fulton City, Ill., April 23, 1858. He completed the course at Rutgers College, subsequently studied law and was admitted to the bar, which he abandoned for the more congenial career in which he has achieved great success. He entered the railroad service in 1877 as assistant in the engineering corps of the Pennsylvania Railroad; from 1879 to 1881, was transitman in the employ of the Engineer Corps of the United States army; 1881 to 1883, leveller, transitman and topographer on the survey of the Mexican National Railway, from the Rio Grande River to Saltillo, Mexico; 1883 to 1884 assistant engineer Chicago Division of the Pan Handle; 1884 to 1886 Engineer Maintenance of Way of the I. & V. Division; 1886 to 1888 Engineer of Maintenance of Way of the Chicago Division; 1888 to 1889 same position on the Cleveland & Pittsburgh Division, of which he became Superintendent in the latter year. On Jan. 15, 1896, he was promoted from this position to the general management of the entire Pennsylvania System West of Pittsburgh. Mr. Loree early attracted the attention of the Pennsylvania officials by criticising the plans that had been sent out from the Chief Engineer's office for the construction of a yard in Indiana. His points were well taken and the yard was built in accordance with new plans, embodying his ideas. While Engineer Maintenance of Way of the Division between Logansport and Chicago the excellence of his work on the track and buildings led to his transfer to the Cleveland & Pittsburgh Division, which was feeling the strain of the increasing ore and coal traffic between the

movement of the enormous traffic of the last two years. Mr. Loree has been president of the American Railway Association during the past three years, attended the Paris Exposition as a representative of that body, and delivered the address on behalf of the American roads at the railroad conference. He has made various other addresses which have been widely read, the University of Wisconsin having distributed in pamphlet a discussion before the students of that institution. Mr. Loree was the first railroad officer in the United States to organize a centralized police system which has performed excellent service in ridding the tracks and trains of tramps and thereby has greatly reduced theft and disorder.

ELECTIONS AND APPOINTMENTS.

Arizona & Southeastern.—C. P. Colburn has been appointed Auditor, with headquarters at Bisbee, Ariz.

Butte, Anaconda & Pacific.—W. Scallon has been elected President.

Canadian Pacific.—On Jan. 1 the following appointments took effect: F. W. Peters, Assistant General Freight Agent of the Pacific Division, with headquarters at Vancouver, B. C., succeeding Allan Cameron, resigned to accept service with another company; H. E. Macdonell, Acting Assistant General Freight Agent of the Kootenay and Boundary Districts at Nelson, B. C.

Chicago & Alton.—J. H. Barrett, heretofore General Superintendent of Transportation of the Southern, has been appointed General Superintendent of the C. & A., succeeding Willis E. Gray, resigned, effective Jan. 1.

Chicago & Erie.—H. W. Forward has been appointed Assistant General Freight Agent, with headquarters at Chicago, Ill.

Chicago & Northwestern.—A. Montzheimer, Superintendent of Bridges and Buildings, on the Wisconsin Division, will assume also the duties heretofore discharged by Henry Crane, Superintendent of Bridges and Buildings at Janesville, resigned.

Chicago Great Western.—At a meeting of the stockholders, Dec. 29, W. A. Read was elected a Director.

Chicago, Rock Island & Pacific.—C. E. Wickham has been appointed General Roadmaster, with headquarters at Davenport, Iowa, in charge of lines east of the Missouri River, succeeding J. H. Conlen, transferred. W. H. Davison becomes General Roadmaster at Topeka, Kan., in charge of lines west of the M. R., succeeding H. R. Irvine, resigned. R. W. Day, heretofore Division Engineer of lines west of the M. R., will be in charge of the lines east, at Chicago, Ill., and will be succeeded by J. F. Carey, at Topeka, Kan. T. J. Clark has been appointed General Agent Passenger Department, at Los Angeles, Cal., succeeding U. S. G. Hough, resigned.

Cleveland, Akron & Columbus (Pennsylvania Company).—J. F. Miller, heretofore General Superintendent of the Southwest System of the P. Co., has been elected Vice-President of the C. A. & C.

Cleveland, Cincinnati, Chicago & St. Louis.—C. J. Brister has been appointed Assistant General Freight Agent at Cincinnati, Ohio, in charge of tariff bureau.

Delaware, Lackawanna & Western.—The headquarters of Fred Warner, Division Engineer, have been removed from Scranton, Pa., to Hoboken, N. J.

Dooly Southern.—W. L. Robuck has been appointed Secretary and Treasurer, succeeding C. M. Killian.

Grand Trunk.—R. S. Logan has been appointed Assistant to the General Manager, effective Jan. 1.

Great Northern.—H. A. Kennedy has been appointed Superintendent of the Kalispell Division, with headquarters at Kalispell, Mont., succeeding P. F. Connelly, assigned to other duties, effective Jan. 1.

Gulf & Ship Island.—C. I. Millard, General Traffic Manager, having resigned, that position is abolished.

Illinois Central.—The line extending from Effingham, Ill., to Switz City, Ind., known as the Effingham District, Chicago Division, will be transferred to the Peoria Division.

On Jan. 1, the jurisdiction of the Transportation Department, Freeport Division, was extended to the west limit of Hawthorne Yard and that of the Road Department, Sixth Division, to the junction of the St. Charles Air Line.

Indiana, Illinois & Iowa.—Riley Williams, Superintendent, at Kankakee, Ill., has resigned.

Indianapolis Union.—W. T. Cannon, Treasurer and Purchasing Agent, has been appointed Secretary, succeeding the late W. N. Jackson.

Kansas City Southern.—We are informed that the report, widely circulated, that W. E. Gray, heretofore General Superintendent of the Chicago & Alton, had been appointed General Manager of the K. C. S., is without foundation.

Marietta, Columbus & Cleveland.—L. W. James has been appointed General Freight and Passenger Agent, with headquarters at Marietta, Ohio, succeeding W. E. Pearce, resigned.

Mexican.—The position of Traffic Superintendent, heretofore held by A. L. Van Antwerp, has been abolished and Mr. Van Antwerp has been appointed General Freight and Passenger Agent, with D. W. Harvey as Assistant General Freight and Passenger Agent.

Missouri Pacific.—E. B. Lane has been appointed Assistant General Freight Agent at St. Louis, Mo., succeeding S. V. Derrah, resigned.

New York, New Haven & Hartford.—An official order has been issued by this company announcing the following changes in the divisions of the road from the 1st of February, 1901:

The present Plymouth and Cape Cod Divisions will be consolidated and called the Plymouth Division, with headquarters at Boston. The present Northern and Taunton Divisions will be consolidated and called the Taunton Division, with headquarters at Taunton. The present Worcester and Central Divisions will be consolidated and called the Worcester Division. To the Worcester division will also be attached all the Providence terminals, including the part of the present Providence Division west of the Boston switch, the Hope branch and the present Stonington Division to the west end of the Auburn yard, including the branch to Harbor Junction. All the Worcester terminals will also be included in the Worcester Division. The above, together with the changes above mentioned, will constitute the Eastern District.

The present Stonington, New London and Norwich Di-

visions, except as above noted, will be consolidated and called the Shore Line Division, with headquarters at New London. The present Air Line and Northampton Divisions will be called the Air Line-Northampton Division, with headquarters at New Haven. All of the New Haven terminals will be consolidated and known as the New Haven Terminal, and will be in charge of a Superintendent, who will report direct to the General Superintendent of the Western District and have his headquarters at the New Haven passenger station.

So much of the present Danbury Division as is included between Wilson's Point and Brookfield Junction will be attached to the New York Division. The Litchfield branch of the Danbury Division between Bethel and Litchfield will be attached to the present Berkshire Division.

The Western District will comprise the New York, Shore Line, Hartford, Berkshire, Highland, Naugatuck and Air Line-Northampton Divisions and the New Haven Terminal.

The above changes affect only the Transportation Department. The Superintendents of the revised divisions are as follows:

Western District.—Shore Line Division—J. V. A. Trumbell, Superintendent; C. C. Elwell, Assistant; Air Line, Northampton Division—W. A. Waterbury, Superintendent; New Haven Terminal—P. E. Bowman, Superintendent.

Eastern District.—Plymouth Division—J. H. French, Superintendent; J. N. Ross, Assistant; Taunton Division—L. N. Marshall, Superintendent; G. H. Taylor, Assistant Superintendent; Worcester Division—A. R. Whaley, Superintendent; C. F. Kennedy, Assistant; effective Feb. 1.

Ohio Central Lines.—The jurisdiction of J. F. Angell, Superintendent of the Eastern Division, has been extended over the Western Division, with headquarters at Columbus, Ohio, succeeding H. C. Ferris, transferred.

Ohio River & Lake Erie.—John E. Newell has been elected President, with headquarters at Cleveland, Ohio, and James R. Garfield, Secretary, succeeding G. D. L'Huilier. Mr. Newell succeeds G. E. Taintor.

Oregon Railroad & Navigation.—Allan Cameron, heretofore Assistant General Freight Agent of the Canadian Pacific, has been appointed General Agent in Hong Kong, for the steamships chartered to run in connection with the O. R. & N. line, via Portland.

Pennsylvania.—J. W. Reynolds has been appointed General Agent at Erie. The jurisdiction of Thomas A. Roberts, Superintendent of the Middle Division of the Philadelphia & Erie, has been extended over the Western Division, heretofore in charge of Mr. Reynolds. The Lewiston Division was detached from the Pennsylvania Railroad Division and W. B. McCaleb, Superintendent of the Sunbury Division, was appointed Superintendent of the L. D. The low grade portion of the Allegheny Valley was detached from the Philadelphia & Erie Railroad Division and placed in the Buffalo & Allegheny Valley Division, forming a new division to be known as the Low Grade Division, with Charles B. Price, Superintendent of the River Division, in charge of the new division also.

T. R. Browne, Master Mechanic at Altoona, Pa., has resigned to go with the Westinghouse Air Brake Co., at Wilmerding, on Feb. 1.

Pennsylvania Company.—W. B. Blake has been appointed Engineer Maintenance of Way of the Western Division, succeeding E. G. Ericson, promoted. (p. 15.)

Rio Grande Western.—S. V. Derrah, heretofore Assistant General Freight Agent of the Missouri Pacific, has been appointed General Freight Agent of the R. G. W., succeeding S. J. Henry.

Seaboard Air Line.—E. St. John, Vice-President and General Manager at Portsmouth, Va., has resigned, effective Jan. 15. Robert E. L. Bunch has been appointed General Passenger Agent, with headquarters at Portsmouth, Va., succeeding L. S. Allen, resigned, effective Jan. 1.

Southern.—G. B. Allen has been appointed Assistant General Passenger Agent of the St. Louis-Louisville Lines at St. Louis, Mo.

Weyeross Air Line.—H. C. McFadden has been appointed General Passenger Agent.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—Surveys are reported in progress in the vicinity of Pnoli, Ind. T., for change of grades along the Canadian River.

ATLANTIC & LAKE SUPERIOR.—This company is asking for legislation from the Parliament of Canada, extending the time for the completion of the line. (Construction Supplement, July 27, 1900.)

BRITISH COLUMBIA ROADS.—Messrs. Crease & Crease, of Victoria, B. C., have given notice of application to the Legislature of British Columbia, to incorporate a company to build a railroad from a point at or near Taku Inlet, B. C., to a point at or near the Little Salmon River, then to Pike Lake, and along the east side of Atlin Lake to Atlin City, and thence north to the northern boundary of the province.

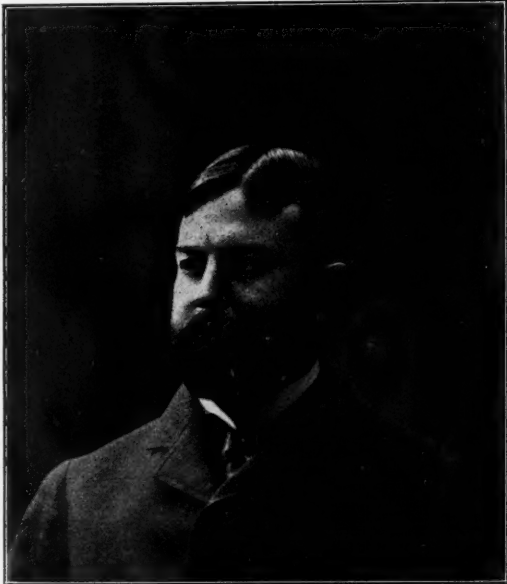
Messrs. Wilson & Senkler, of Vancouver, B. C., have given notice of an application to the Legislature of British Columbia to incorporate a company to build from a point at or near the town of Midway to a point at or near the mouth of Rock Creek, thence northeast to the West Fork of Kettle River and along that river to its head; thence via Okanagan Mission Valley to Vernon, B. C.

Messrs. Crease & Crease, of Victoria, B. C., have given notice of application to the Legislature of British Columbia to incorporate a company to build a railroad from a point in Wellington District north to a point in Comox District, Vancouver Island, situate on or near the fiftieth parallel of latitude on or near the east coast of Vancouver Island; thence north through Sayward and Rupert districts to Cape Scott, or to some other point at or near the north end of Vancouver Island, with branch lines to the coast on either side of the island.

CALIFORNIA NORTHWESTERN.—Muir Bros., who have completed their contract for the first ten miles out from Ukiah, Cal., have taken the contract for an additional ten miles. The road is projected northwest about 60 miles up the coast through Willits. Track laying on the first section is practically completed. (Sept. 14, p. 614.)

CHICAGO, BURLINGTON & QUINCY.—Preliminary surveys are made, according to report, for a cut-off from White Ledge, six miles west of Hannibal, Mo., to run west about 14 miles to a point near Monroe City. This will cut out Palmyra and save about eight miles on the line toward Denver.

Surveys have been made, according to report, for a cut-off, including a bridge, across the La Platte River to



lakes and the Pittsburgh district. The administration of this division had been along old-time methods that were inadequate to meet the new stress. It was Mr. Loree's task to reduce the grades, improve the alignment, increase the strength of the structures and the power of equipment. He quickly made a record, and at the age of 38 he was appointed General Manager. Mr. Loree is an omnivorous reader, and from boyhood has been a student of the social organism, not only from the standpoint of the engineer and railroad officer, but from that of the economist in a broad, practical sense. During three visits to Europe he made thorough investigations of the methods of the British and Continental railroads, and he has kept abreast of the discussion of every problem in railroad development. To the duties of the general management he brought the wide range of his knowledge and his great power of analysis. In the attack of a question his method is that of the modern scientist; the fullest information is obtained by searching investigation from every source, and every argument is carefully weighed before decision is reached. As one of his subordinates says of him, "Mr. Loree carefully thinks out to the last detail his course in every problem that is presented to him and after forming his plans never swerves from their execution. Some of us who had been more closely in touch with actual practice on different parts of the system when he became General Manager were inclined to criticise some of his moves, but we have found that he was building for the future, and I do not know of a man on the system to-day who does not recognize the wisdom of his policy throughout." Mr. Loree did efficient work as one of the junior officers at Johnstown. During the strike of 1894 he had charge of the policing of the railroad property in Chicago, and was active in the steps that broke the strike. During his administration vast expenditures have been made in reducing the grades, straightening track, and strengthening structures along the main lines of his system, all with a view toward the quick and economical handling of traffic. These expenditures have begun to bear fruit, having made possible the expeditious

shorten the distance between Omaha, Neb., and Plattsmouth. It is proposed to sell the old bridge to Cass County.

CHICAGO & NORTHWESTERN.—Surveys are reported in progress for a branch from Valentine, Neb., on the Fremont, Elkhorn & Missouri Valley, to run southwest about 200 miles to Scranton, Colo., to connect with the Colorado Eastern into Denver. Elliott O. Duncan is in charge of the surveys which have been made as far as Sidney.

CHOCTAW, OKLAHOMA & GULF.—Right of way is being secured, according to report, for a line from Newport, Ark., terminus of the White & Black River Valley leased line, to run northwest to the mining regions in Newton County, Ark.

CINCINNATI & CLEVELAND.—This company was incorporated in Ohio, Dec. 31, with a capital stock of \$15,000, to be increased later, to build from Cincinnati northeast across the state to Cleveland. The incorporators are: Powell Crossley, Robert Simpson, Oliver E. Conner, Ezra E. Williams and David B. Hunt, all of Columbus.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—The trustees of the Cincinnati Southern have agreed upon a suit to test their right to issue \$2,500,000 bonds for improving the terminals of the road at Cincinnati without submitting the matter to the voters of the city.

CLARION & SUMMERVILLE.—This company was incorporated in Pennsylvania, Jan. 3, with a capital stock of \$200,000, to build a line from Clarion to Summerville, on the Pennsylvania, 15 miles. J. C. Whittla, of Beaver Falls, is President.

COLORADO & WYOMING.—Orman & Crook, of Pueblo, are reported to have taken the contract to build 23 miles of line from Trinidad, Colo., west up the Las Animas River to Weston. Building was to be begun about Jan. 1. This is under the amended incorporation recently noted. (Nov. 2, p. 732.)

DUNDALK, SPARROWS POINT & NORTH POINT.—This company was incorporated in Maryland, Jan. 4, with a capital stock of \$250,000, to build an electric railroad from Dundalk, on the Baltimore & Ohio, near Baltimore, to run southeast to North Point. The incorporators are: Nelson Perin, Edward L. Bartlett, William A. House, Henry A. Parr and George C. Jenkins.

EAGLE PASS, FREDERICKSBURG & LLANO.—This company was incorporated in Texas, Jan. 3, with a capital stock of \$250,000, to build a railroad from Eagle Pass northeast about 250 miles to Llano, on the Austin & Northwestern line of the Southern Pacific. The company was organized in February, 1900. The incorporators are: A. H. Evans, C. C. Drake, J. R. Burr, R. W. Dowe, F. E. Blesse, Emil Oppenheimer, Fred L. Debona, of Eagle Pass; W. J. Moore, N. J. Badu, of Llano; Alfred Vanderstucken and Temple D. Smith, of Fredericksburg. (Construction Supplement, July 27, 1900.)

FLEMINGTON & ASTOR.—This company has been incorporated in West Virginia to build a railroad from Flemington, on the main line of the Baltimore & Ohio, to run south to Astor. It is stated that building is to be begun at once. The officers are: President, Rockwell Marietta; Vice-President, Lin F. Ruth; Secretary and Treasurer, A. D. Soisson.

GREAT NORTHERN.—A cut-off, according to report, has been decided upon, to run from Great Falls, Mont., northwest about 155 miles through Browning, on the main line, into the Altin mining district.

ILLINOIS CENTRAL.—C. D. Smith & Co., of Birmingham, Ala., are reported to have a contract for 30 miles of the Yazoo & Mississippi Valley line from Lake Cormorant, 21 miles, south to Memphis, to run south toward Tutwiler, Miss. The line, when completed, is to be 65 miles long, of which 20 miles at the Tutwiler end was building last year. Grading is to be completed within 10 months. (Construction Supplement, July 27, 1900.)

KONA-KAU.—Under this title arrangements are being made for a railroad on the west coast of the Island of Hawaii from 85 to 90 miles long. The promoter is Mr. Carl Cooper, who is said to be a brother of a brewer in Chicago. Mr. Cooper has returned to Chicago to obtain capital for building. Surveys are made and the road will run along lands from 1,200 to 1,500 ft. above sea level, tapping some of the most valuable sugar plantations of the island.

KOOTENAY CENTRAL.—Notice of application to the Canadian Parliament has been filed by J. A. Harvey and Wm. R. Ross, of Fort Steele, B. C., for a railroad from Fort Steele to Elko, or Wardner, on the Crows Nest Pass line of the C. P. R., thence on the east or west side of Wigwam River to the International boundary; also from Fort Steele over the east or west side of the Kootenay River to Windemere and thence to Golden on the main line of the C. P. R.

LINDSAY, BOBCAYGEON & PONTYPOOL.—Building was reported begun last week on this line from Burketon, Ont., on the C. P. R., via Lindsay, 40 miles. W. C. T. Boyd, of Bobcaygeon, is interested. (Construction Supplement, July 27, 1900.)

LITTLE ROCK SOUTHERN.—This company was incorporated in Arkansas, Dec. 31, with a capital stock of \$3,500,000, to build a railroad from Little Rock south 138 miles to a point on the Louisiana state line. The Directors are: P. T. Witherop, F. de L. Hyde, Louis K. Hyde, F. C. Wheeler, J. P. Crossley, all of Titusville, Pa.

MCCONNELLSBURG & POTOMAC.—This company has been organized, with a capital stock of \$200,000, by citizens of Fulton County, Pa., to build a railroad from McConnellsburg south about 20 miles to Hancock, Md., on the Potomac River, just across from the Baltimore & Ohio main line in West Virginia. The J. J. Van Horne Construction Co., of New York, will build the road.

MISSISSIPPI ROADS.—The Hoyt & Woodin Mfg. Co., of Minter City, is asking bids, up to Jan. 15, for grading and surfacing a roadbed for a standard gage track from the company's mill to a point near Minter City, in Leflore County, about 4½ miles.

MONONGAHELA SOUTHERN.—Building is reported begun on this line of the Carnegie Company from Duquesne, Pa., to run southwest about 30 miles to Finleyville, on the Baltimore & Ohio. (Construction Supplement, July 27, 1900.)

MOREHEAD & WEST LIBERTY.—Building was begun, late in December, according to report, on this line in Kentucky from Morehead south about 20 miles to West Liberty. Alexander Harding, of Philadelphia, Pa., is President, and W. A. Young, of Morehead, Vice-President. (Construction Supplement, July 27, 1900.)

NASHVILLE, FLORENCE & NORTHERN.—Contracts are to be let within the next 90 days for the entire line from

Florence, Ala., north 230 miles via Nashville, Tenn., to Litchfield, Ky. (Nov. 23, 1900, p. 184.) The city of Nashville has voted to subscribe \$1,000,000 in aid of the road. Jere Baxter, of Nashville, President of the Tennessee Central, is President of the N. F. & N. (Official.)

NEW YORK, NEW HAVEN & HARTFORD.—Petitions are being circulated in the towns of southeastern Rhode Island for the building of an elevated road through Providence, R. I., from India street to the union station, about one mile.

NORTH CAROLINA ROADS.—Joseph Hyde Pratt, of Chapel Hill, N. C., writes that no company has as yet been organized to build the proposed electric line from Durham, N. C., to Chapel Hill. He is working on the proposition and hopes to push it through. (Dec. 28, 1900, p. 808.)

OKLAHOMA & WESTERN.—This company was organized in Oklahoma, Dec. 31, with a capital stock of \$2,000,000, to build a line from Oklahoma City west through Canadian, Washita and Roger Mills counties to the Texas line near Amarillo. It is said that surveys will be begun at once and articles of incorporation filed with the Secretary of the Territory. The directors are: James Campbell, William P. Reed, John P. Newell and Festus J. Wade, of St. Louis; D. C. Lewis, J. L. Wilkins and E. E. Brown, of Oklahoma City.

OLEY VALLEY.—Building is reported in progress on this electric line in Pennsylvania below Black Bear. The line is projected from Reading east about 15 miles to Boyertown. Wm. Morton, Jr., & Co., of Philadelphia, and the Cambria Iron Co. are said to have the contract for the rails; the Henry Fry Lumber Co. for the trolley poles, and Brill & Co., Philadelphia, and Jackson & Sharp, Wilmington, for the cars. According to the contract, the line is to be completed by July 1. John A. Rigg, of Reading, is President. (Sept. 28, p. 644.)

OMAHA BRIDGE & TERMINAL.—The company is building a terminal yard at South Omaha, Neb. Part of the real estate is acquired. Negotiations are in progress for other, and condemnation proceedings are begun for the rest. (Official.)

PARIS, CHOCTAW & LITTLE ROCK.—Senator Culberson, of Texas, has introduced a bill in the U. S. Senate to authorize this company to build a railroad bridge across the Red River in Red River County, Tex., and to build a railroad across the Indian Territory. The road is projected from Paris, Tex., northeast towards Hot Springs and Little Rock, Ark.

PENNSYLVANIA.—Surveys are in progress and contracts will probably be let within a week for a branch from near Volant to limestone territory near Leesburg, Pa. (Official.)

SOUTHERN.—An officer writes that the company is not contemplating the building of a branch, as reported, from Oliver Springs, Tenn., six miles long. (Dec. 21, 1900, p. 852.)

Nor has the company been approached concerning a proposition to extend the Nashville & Augusta line from Gamble's Store, Tenn., northeast to Sevierville. (Dec. 28, 1900, p. 868.)

SOUTH HAVEN & EASTERN.—An officer writes that the road to be built from Paw Paw Lake, Mich., to connect with the South Haven & Eastern at Covert will not be built nor owned by his company, although they may operate it. (Dec. 21, 1900, p. 852.)

SOUTHERN MISSOURI & ARKANSAS.—The officers of this company have accepted the proposition of people of Poplar Bluff, Mo., for the extension from Puxico southwest about 15 miles to that city. Poplar Bluff offers \$15,000 and guarantees \$10,000 of patronage. Surveys are begun. (Oct. 26, p. 712.)

The company has begun another survey, according to report, for the extension from Burgin, Ky., southeast about 119 miles to Jellico, Tenn. Two surveys have been made, via Lancaster and via Danville. (Construction Supplement, July 27, 1900.)

SOUTHERN PACIFIC.—An officer denies that the Natron (Ore.) branch is to be extended, as reported. (Dec. 14, p. 834.)

UNION PACIFIC.—Extensive improvements are reported under consideration on the Kansas Division, comprising grade reduction and curve elimination between Kansas City and Topeka, Kan., and Salina and Ellsworth.

An officer writes that there is no truth in the report that the company has let a contract for the Echo Canyon cut-off between Evanston, Wyo., and Salt Lake. (Dec. 21, 1900, p. 852.)

UNION RAILROAD & TRANSPORTATION.—This company was incorporated in Oregon, Dec. 27, with a capital stock of \$600,000, to build a railroad from Union to the Snake River. The office is at Union. The incorporators are: E. W. Davis, W. H. Ewing, L. J. Davis, F. E. Foster and G. F. Hall.

WARASH.—An officer states that there is no truth in the report that his company will build an extension from Fort Wayne, Ind., to Elkhart. (Dec. 21, 1900, p. 852.)

GENERAL RAILROAD NEWS.

ALGOMA CENTRAL.—This company is seeking Parliamentary power to enter into an agreement or to amalgamate with the Canadian Pacific, the Grand Trunk, the Lake Superior & Hudson Bay, the Ontario, Hudson Bay & Western and the Manitoulin & North Shore; to issue its notes, bonds, debentures or other securities for the purchase of vessels and water craft; for power to extend its line from a point on the main line of the Canadian Pacific, thence north to some point on James Bay in the Province of Ontario, and to change the name of the company to the Algoma Central & Hudson Bay.

ARKANSAS & OKLAHOMA.—The St. Louis & San Francisco announces the taking over of this line which runs from Roger, Ark., to Southwest City, Mo., 36.5 miles, and is completing 16½ miles more to Grand River, Ind. T. (Nov. 16, 1900, p. 764.)

BALTIMORE & OHIO.—Henry P. Scott, of Wilmington, Del., a preferred stockholder, has brought suit in the Circuit Court at Baltimore, asking the court to enjoin the railroad from paying larger dividends to the holders of common stock than are received by the holders of the preferred.

BOSTON & ALBANY.—The Massachusetts R. R. Commission has approved the issue of \$2,500,000 3½ per cent. 50-year bonds for improvements at East Boston. These include the following: Steel elevator, \$1,200,000; grain conveyor additions, \$100,000; storage warehouse, 10 stories, \$550,000; double track, etc., on Grand Junction

branch, \$500,000; dredging, new buildings, etc., \$261,920; engineering and contingencies, \$261,192.

CANADIAN NORTHERN.—This company is applying to the Parliament of Canada for an act confirming the amalgamation with the Ontario & Rainy River and the Manitoba & Southeastern, and confirming the bond issue and mortgages securing the same, covering the Ontario division and the Gilbert Plains branch of the company, and authorizing the company to make traffic arrangements with the company constructing a bridge over the Rainy River, and with the Minnesota & Manitoba, and empowering the company to construct several branch lines.

CENTRAL OF NEW JERSEY.—J. P. Morgan & Co., New York, at noon Saturday, announced the acquiring of a controlling interest in that road and the offer of it to the Reading. The Directors of the Reading have accepted the offer. A fuller statement is given in another column.

CHICAGO & NORTHWESTERN.—Enough 5 and 6 per cent. sinking fund bonds of 1879 will be drawn by lot, Jan. 31, at 105 and accrued interest to absorb \$144,302.56.

CHICAGO, BURLINGTON & QUINCY.—Sealed proposals are asked up to noon, Jan. 14, for as many Denver extension 4 per cent. bonds, due Feb. 1, 1922, as will absorb \$87,323.97.

CHICAGO, MILWAUKEE & ST. PAUL.—Seventeen income sinking fund convertible 5 per cent. bonds have been drawn by lot, to be paid at 105 and accrued interest, at the company's office, 30 Broad street, New York. Interest will cease Feb. 2. (Jan. 5, 1900, p. 14.)

DOVER & STATESBORO.—The Central of Georgia has acquired control of this line, which runs from Dover, Ga., to Statesboro, 10 miles. The road was opened Nov. 21, 1889.

EAST LOUISIANA.—Frank B. Hayne, one of the largest stockholders, has bought a controlling interest in this line, which runs from Pearl River, La., on the New Orleans & Northeastern, to Covington, La., 25 miles, and from Mandeville Junction to Mandeville, La., 11.3 miles. A number of improvements have been made.

ILLINOIS CENTRAL.—The company has disposed of all its remaining 60,000 acres of land under the original grant in Illinois to a syndicate headed by Geo. W. Fithian, of Newton, Ill. The property is located in Franklin, Johnson, Perry, Jackson and Alexander Counties, and the price is said to be between \$275,000 and \$300,000.

LEHIGH VALLEY.—Drexel & Co., Philadelphia, have taken up their option of 75,000 shares of capital stock from the Asa Packer estate and the Lehigh University. This is sufficient to give them control of the company. (June 1, 1900, p. 364.)

LITTLE MIAMI.—The shareholders, on Jan. 29, will vote on the making of a mortgage to secure \$3,000,000 of 3½ per cent. bonds to be used in repaying the advances by the leasing company, the Pittsburgh, Cincinnati, Chicago & St. Louis, for betterments and improvements, and for retiring 7 per cent. outstanding betterment bonds. (Feb. 9, 1900, p. 96.)

METROPOLITAN STREET (NEW YORK CITY).—Justice Bischoff, of New York City, in the Supreme Court, has handed down a decision to grant the injunction of certain property holders in the vicinity of 104th and 105th streets to restrain the Metropolitan from operating the Lexington avenue branch at that point, on the claim that the franchises were sold illegally. The order is not yet effective.

NELSON & FORT SHEPARD.—The Canadian Pacific has taken control of the section of the N. & F. S. between Nelson, B. C., and Five-Mile Point, which was bought some time ago, giving the C. P. R. entrance into Nelson. (June 29, 1900, p. 458.)

NEW YORK, PHILADELPHIA & NORFOLK.—The first dividend, being 2 per cent., has been declared on the stock of this company, payable Jan. 3.

NIAGARA, ST. CATHARINES & TORONTO.—This company is applying to Parliament for power to amalgamate with any other connecting electric company, or to purchase or lease such other company's lines.

OREGON RAILROAD & NAVIGATION.—First mortgage 6 per cent. sinking fund bonds to the par value of \$144,000 have been drawn for payment at par at the Farmers' Loan & Trust Co., New York, interest ceasing Jan. 1. (Dec. 21, 1900, p. 852.)

PENNSYLVANIA.—In the call for the annual meeting to be held March 12, at Philadelphia, stockholders are notified that they are to pass upon the question of increase of capital stock. (Nov. 30, 1900, p. 802.) The company has paid the \$1,000,000 5 per cent. Navy Yard bonds, due Jan. 1.

PERE MARQUETTE.—The company has sold \$1,000,000 Flint & Pere Marquette 4 per cent. bonds at par and interest, less a commission, to retire the \$1,000,000 Holly, Wayne & Monroe 8 per cent. bonds, which matured Jan. 1. (Jan. 4, p. 16.)

RAQUETTE LAKE.—This line, extending from Clearwater, N. Y., to Raquette Lake, 19 miles, was taken over by the New York Central & Hudson River, on Jan. 1. (Aug. 13, p. 246.)

ST. LOUIS & NORTH ARKANSAS.—This company, successor to the Eureka Springs, has filed its mortgage for \$3,212,500 to the Union Trust Co., of St. Louis, as trustee.

SANDUSKY, NORWALK & SOUTHERN.—This company, recently incorporated in Ohio, is reported to have taken over the People's Electric and the Sandusky, Milan & Norwalk Electric, and will build an extension south about 45 miles to Mansfield. (Railroad Construction column, Nov. 30, 1900, p. 802.)

STUTTGART & ARKANSAS RIVER.—Judge Trieber, at Little Rock, Ark., on Jan. 14, confirmed the sale of this property to the St. Louis Southwestern on condition that the matter remain open until Jan. 15, and then if no objections are offered by interested persons, the sale will be considered confirmed. (Nov. 30, 1900, p. 802.)

TOLEDO, ST. LOUIS & KANSAS CITY.—Judge Thompson, of the U. S. Court, at St. Louis, Mo., has signed an order discharging Samuel Hunt as Receiver of the St. Louis, Toledo & Kansas City, now reorganized as the Toledo, St. Louis & Western and the Toledo & East St. Louis. (Oct. 19, p. 696.)

WARREN.—Redmond, Kerr & Co. are offering a limited amount of first refunding mortgage 3½ per cent. bonds at 105 and interest.